US008867708B1

(12) **United States Patent**
Lavian et al.

(10) **Patent No.: US 8,867,708 B1**
(45) **Date of Patent: *Oct. 21, 2014**

(54) **SYSTEMS AND METHODS FOR VISUAL PRESENTATION AND SELECTION OF IVR MENU**

(76) Inventors: **Tal Lavian**, Sunnyvale, CA (US); **Zvi Or-Bach**, San Jose, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 254 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **13/410,318**

(22) Filed: **Mar. 2, 2012**

(51) **Int. Cl.**
H04M 11/06 (2006.01)
G06F 15/16 (2006.01)
G06Q 30/00 (2012.01)
G10L 15/06 (2013.01)

(52) **U.S. Cl.**
USPC **379/88.18**; 379/70; 379/88.13; 379/93.17; 379/218.01; 379/265.13; 455/406; 455/563; 704/270.1; 704/277; 705/37; 709/206; 709/217; 710/63; 710/72

(58) **Field of Classification Search**
CPC H04M 1/2535
USPC 379/70, 88.01, 88.09, 88.11, 88.13, 379/88.18, 88.23, 93.17, 93.25, 100.01, 379/208.01, 218.01, 265.09, 265.13, 266.1; 455/406, 563; 704/270.1, 277; 705/37; 709/206, 217; 710/63, 72
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,653,045 A 3/1987 Stanley et al.
4,736,405 A 4/1988 Akiyama
4,897,866 A 1/1990 Majmudar et al.
5,006,987 A 4/1991 Harles
5,007,429 A 4/1991 Treatch et al.
5,027,400 A 6/1991 Baji et al.
5,086,385 A 2/1992 Launey et al.
5,144,548 A 9/1992 Salandro
5,265,014 A 11/1993 Haddock et al.
5,294,229 A 3/1994 Hartzell et al.
5,335,276 A 8/1994 Thompson et al.
5,416,831 A 5/1995 Chewning, III et al.

(Continued)

FOREIGN PATENT DOCUMENTS

EP 1225754 A3 7/2003
EP 1001597 A3 9/2003

(Continued)

OTHER PUBLICATIONS

Yin, M. and Zhai, S., "The Benefits of Augmenting Telephone Voice Menu Navigation with Visual Browsing and Search," CHI'06 Proceedings of the SIGCHI conference on Human Factors in computing systems: pp. 319-328, ACM, Montreal, Canada (Apr. 2006).

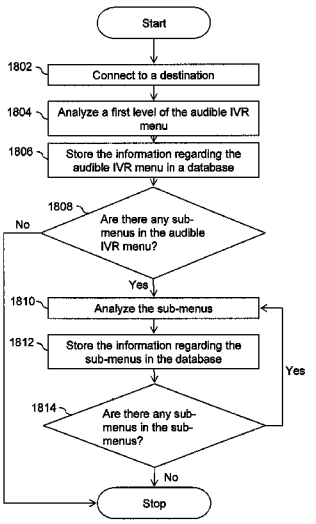
(Continued)

Primary Examiner — Gerald Gauthier

(57) **ABSTRACT**

Embodiments of the invention provide a system for enhancing user interaction with Interactive Voice Response (IVR) destinations, the system comprising: a processor; and a memory coupled to the processor, the memory comprising: data encoding a database, the database comprising a list of telephone numbers associated with one or more destinations implementing an IVR; instructions executable by the processor for automatically communicating with at least one user; and instructions executable by the processor to pull at least one menu from the database and display the menu to the at least one user, wherein the menu is associated with a telephone number dialed by the at least one user, and wherein the menu comprises at least one icon.

20 Claims, 32 Drawing Sheets



(56) **References Cited**

U.S. PATENT DOCUMENTS

5,417,575	A	5/1995	McTaggart	
5,422,809	A	6/1995	Griffin et al.	
5,465,213	A	11/1995	Ross	
5,465,401	A	11/1995	Thompson	
5,475,399	A	12/1995	Borsuk	
5,499,330	A	3/1996	Lucas et al.	
5,519,809	A	5/1996	Husseiny et al.	
5,533,102	A	7/1996	Robinson et al.	
5,550,746	A	8/1996	Jacobs	
5,572,581	A	11/1996	Sattar et al.	
5,585,858	A	12/1996	Harper et al.	
5,586,235	A	12/1996	Kauffman	
5,588,044	A	12/1996	Lofgren et al.	
5,592,538	A	1/1997	Kosowsky et al.	
5,606,361	A	2/1997	Davidsohn et al.	
5,633,909	A	5/1997	Fitch	
5,633,916	A	5/1997	Goldhagen et al.	
5,657,221	A	8/1997	Warman et al.	
5,689,648	A	11/1997	Diaz et al.	
5,724,412	A	3/1998	Srinivasan	
5,739,814	A	4/1998	Ohara et al.	
5,740,549	A	4/1998	Reilly et al.	
5,768,142	A	6/1998	Jacobs	
5,790,652	A	8/1998	Gulley et al.	
5,794,205	A	8/1998	Walters et al.	
5,796,806	A	8/1998	Birckbichler	
5,802,283	A	9/1998	Grady et al.	
5,802,526	A	9/1998	Fawcett et al.	
5,807,336	A	9/1998	Russo et al.	
5,819,225	A	10/1998	Eastwood et al.	
5,822,404	A	10/1998	Cave	
5,822,405	A	10/1998	Astarabadi	
5,838,682	A	11/1998	Dekelbaum et al.	
5,838,775	A	11/1998	Montalbano	
5,867,816	A	2/1999	Nussbaum	
5,873,068	A	2/1999	Beaumont et al.	
5,885,083	A	3/1999	Ferrell	
5,885,245	A	3/1999	Lynch et al.	
5,890,123	A	3/1999	Brown et al.	
5,892,813	A	4/1999	Morin et al.	
5,907,793	A	5/1999	Reams	
5,912,952	A	6/1999	Brendzel	
5,913,195	A	6/1999	Weeren et al.	
5,920,477	A	7/1999	Hoffberg et al.	
5,937,040	A	8/1999	Wrede et al.	
5,940,488	A	8/1999	DeGrazia et al.	
5,948,040	A	9/1999	DeLorme et al.	
5,956,034	A	9/1999	Sachs et al.	
5,982,875	A	11/1999	Lieben et al.	
5,987,103	A	11/1999	Martino	
6,009,398	A	12/1999	Mueller et al.	
6,014,428	A	1/2000	Wolf	
6,020,915	A	2/2000	Bruno et al.	
6,049,779	A	4/2000	Berkson	
6,055,513	A	4/2000	Katz et al.	
6,062,863	A	5/2000	Kirksey et al.	
6,088,429	A	7/2000	Garcia	
6,088,712	A	7/2000	Huang et al.	
6,091,805	A	7/2000	Watson	
6,091,956	A	7/2000	Hollenberg	
6,104,790	A	8/2000	Narayanaswami	
6,144,848	A	11/2000	Walsh et al.	
6,148,065	A	11/2000	Katz	
6,169,734	B1	1/2001	Wilson	
6,212,547	B1	4/2001	Ludwig et al.	
6,228,921	B1	5/2001	Kasemann et al.	
6,229,694	B1	5/2001	Kono	
6,230,197	B1	5/2001	Beck et al.	
6,259,444	B1	7/2001	Palmer et al.	
6,263,064	B1	7/2001	O'Neal et al.	
6,273,726	B1	8/2001	Kirksey et al.	
6,321,198	B1	11/2001	Hank et al.	
6,335,678	B1	1/2002	Heutschi	
6,366,650	B1	4/2002	Rhie et al.	
6,373,817	B1	4/2002	Kung et al.	
6,400,807	B1	6/2002	Hewitt et al.	
6,405,033	B1	6/2002	Kennedy, III et al.	
6,408,301	B1	6/2002	Patton et al.	
6,427,063	B1	7/2002	Cook et al.	
6,445,694	B1	9/2002	Swartz	
6,449,595	B1	9/2002	Arslan et al.	
6,456,706	B1	9/2002	Blood et al.	
6,460,057	B1	10/2002	Butler et al.	
6,463,145	B1	10/2002	O'Neal et al.	
6,482,156	B2	11/2002	Iliff	
6,505,146	B1	1/2003	Blackmer	
6,510,411	B1	1/2003	Norton et al.	
6,529,500	B1	3/2003	Pandharipande	
6,560,320	B1	5/2003	Paleiov et al.	
6,603,840	B2	8/2003	Fellingham et al.	
6,606,611	B1	8/2003	Khan	
6,606,741	B2	8/2003	Kojima et al.	
6,636,835	B2	10/2003	Ragsdale et al.	
6,653,930	B1	11/2003	Bonomo et al.	
6,658,389	B1	12/2003	Alpdemir	
6,700,972	B1 *	3/2004	McHugh et al.	379/265.13
6,705,869	B2	3/2004	Schwartz	
6,714,519	B2	3/2004	Luzzatti et al.	
6,731,625	B1	5/2004	Eastep et al.	
6,754,181	B1	6/2004	Elliott et al.	
6,754,332	B1 *	6/2004	Kneipp et al.	379/265.13
6,788,770	B1 *	9/2004	Cook et al.	379/100.01
6,791,583	B2	9/2004	Tang et al.	
6,816,580	B2	11/2004	Timmins	
6,820,037	B2	11/2004	Simon	
6,820,062	B1	11/2004	Gupta et al.	
6,826,194	B1	11/2004	Vered et al.	
6,829,368	B2	12/2004	Meyer et al.	
6,856,673	B1	2/2005	Banks et al.	
6,862,713	B1	3/2005	Kraft et al.	
6,865,268	B1	3/2005	Matthews et al.	
6,885,737	B1	4/2005	Gao et al.	
6,889,195	B2	5/2005	Strandberg	
6,920,205	B2	7/2005	Hahn et al.	
6,920,425	B1	7/2005	Will et al.	
6,920,431	B2	7/2005	Showghi et al.	
6,922,466	B1 *	7/2005	Peterson et al.	379/88.09
6,937,705	B1	8/2005	Godfrey et al.	
6,968,506	B2	11/2005	Yacovone et al.	
6,990,455	B2	1/2006	Vozick	
7,020,609	B2	3/2006	Thrift et al.	
7,027,990	B2	4/2006	Sussman	
7,036,128	B1	4/2006	Julia et al.	
7,039,589	B2	5/2006	Whitham	
7,047,196	B2	5/2006	Calderone et al.	
7,065,188	B1	6/2006	Mei et al.	
7,068,643	B1	6/2006	Hammond	
7,092,738	B2	8/2006	Creamer et al.	
7,092,888	B1 *	8/2006	McCarthy et al.	704/277
7,100,118	B1	8/2006	Klask	
7,130,391	B2	10/2006	Janakiraman et al.	
7,133,515	B1 *	11/2006	Cook	379/208.01
7,136,480	B2	11/2006	Mason	
7,139,591	B2	11/2006	Callaghan et al.	
7,145,902	B2	12/2006	Schindler et al.	
7,146,321	B2	12/2006	Cyr et al.	
7,149,549	B1	12/2006	Ortiz et al.	
7,159,008	B1	1/2007	Wies et al.	
7,177,814	B2	2/2007	Gong et al.	
7,180,889	B1	2/2007	Kung et al.	
7,180,985	B2	2/2007	Colson et al.	
7,181,401	B2	2/2007	Johnson et al.	
7,181,502	B2	2/2007	Incertis	
7,188,352	B2	3/2007	Nathan et al.	
7,203,517	B2	4/2007	Shimoda et al.	
7,206,745	B2	4/2007	Sarukkai et al.	
7,206,809	B2	4/2007	Ludwig et al.	
7,209,124	B2	4/2007	Hunt et al.	
7,213,061	B1	5/2007	Hite et al	
7,215,743	B2	5/2007	Creamer et al.	
7,216,348	B1	5/2007	deCarmo	
7,225,409	B1	5/2007	Schnarel et al.	
7,225,455	B2	5/2007	Bennington et al.	
7,228,492	B1	6/2007	Graham	

(56) **References Cited**

U.S. PATENT DOCUMENTS

7,231,636 B1 6/2007 Evans
7,231,656 B1 6/2007 Nathan
7,240,006 B1 7/2007 Brocious et al.
7,240,289 B2 7/2007 Naughton et al.
7,246,063 B2 7/2007 James et al.
7,248,885 B2 7/2007 Benco et al.
7,250,939 B2 7/2007 Lira
7,254,227 B2 8/2007 Mumick et al.
7,260,537 B2 * 8/2007 Creamer et al. 704/270.1
7,265,861 B1 9/2007 Ranalli et al.
7,266,185 B2 9/2007 Trandal et al.
7,266,186 B1 9/2007 Henderson
7,266,499 B2 9/2007 Surace et al.
7,272,222 B2 9/2007 Joseph et al.
7,272,497 B2 9/2007 Koshiji et al.
7,277,854 B2 10/2007 Bennett et al.
7,280,097 B2 10/2007 Chen et al.
7,280,646 B2 10/2007 Urban et al.
7,280,651 B2 10/2007 Anderson
7,286,990 B1 10/2007 Edmonds et al.
7,289,608 B2 10/2007 Kumhyr
7,289,904 B2 10/2007 Uyeki
7,299,405 B1 11/2007 Lee et al.
7,303,121 B2 12/2007 Martinez
7,319,477 B2 1/2008 Katz
7,324,947 B2 1/2008 Jordan et al.
7,328,239 B1 2/2008 Berberian et al.
7,330,890 B1 2/2008 Partovi et al.
7,353,016 B2 4/2008 Roundtree et al.
7,392,193 B2 6/2008 Mault
7,398,215 B2 7/2008 Mesbah et al.
7,406,413 B2 7/2008 Geppert et al.
7,412,533 B1 8/2008 Johnson et al.
7,433,452 B2 10/2008 Taylor et al.
7,440,898 B1 10/2008 Eberle et al.
7,450,112 B2 11/2008 Shneidman
7,460,652 B2 * 12/2008 Chang 379/88.18
7,466,803 B2 12/2008 Burg et al.
7,492,883 B2 2/2009 Kumhyr
7,515,695 B1 * 4/2009 Chan et al. 379/88.18
7,539,480 B2 * 5/2009 Fieldhouse et al. 455/406
7,539,484 B2 5/2009 Roundtree
7,546,143 B2 6/2009 Nelson et al.
7,577,664 B2 * 8/2009 Malik 1/1
7,584,249 B2 9/2009 Mummick et al.
7,606,741 B2 10/2009 King et al.
7,646,858 B2 1/2010 Salafia et al.
7,693,720 B2 4/2010 Kennewick et al.
7,720,091 B2 5/2010 Faber et al.
7,729,490 B2 6/2010 Hemm et al.
7,757,173 B2 7/2010 Beaman
7,809,376 B2 10/2010 Letourneau et al.
7,813,485 B2 10/2010 Yin et al.
7,843,899 B2 11/2010 Burritt
7,864,944 B2 1/2011 Khouri et al.
7,904,516 B2 * 3/2011 Chern 709/206
7,908,381 B2 3/2011 Koch et al.
7,966,188 B2 6/2011 Ativanichayaphong et al.
7,991,125 B2 * 8/2011 Ryals et al. 379/70
8,000,454 B1 * 8/2011 Or-Bach et al. 379/88.18
8,023,624 B2 9/2011 Kargman et al.
8,036,347 B1 * 10/2011 Kanade 379/88.18
8,054,952 B1 * 11/2011 Or-Bach et al. 379/88.18
8,155,280 B1 * 4/2012 Or-Bach et al. 379/88.13
8,160,215 B2 * 4/2012 Or-Bach et al. 379/88.18
8,223,931 B1 * 7/2012 Lavian et al. 379/88.13
8,345,835 B1 * 1/2013 Or-Bach et al. 379/88.23
8,406,388 B2 * 3/2013 Or-Bach et al. 379/88.13
8,537,989 B1 * 9/2013 Lavian et al. 379/93.17
8,548,131 B1 * 10/2013 Lavian et al. 379/88.18
8,548,135 B1 * 10/2013 Lavian et al. 379/93.25
8,553,859 B1 * 10/2013 Lavian et al. 379/93.17
8,566,419 B2 * 10/2013 Purdy et al. 709/217
8,572,303 B2 * 10/2013 Lavian et al. 710/72
8,594,280 B1 * 11/2013 Or-Bach et al. 379/88.01
8,625,756 B1 * 1/2014 Lavian et al. 379/93.17
2002/0055844 A1 5/2002 L'Esperance et al.
2002/0147986 A1 10/2002 Michael et al.
2003/0005126 A1 1/2003 Schwartz et al.
2003/0007625 A1 1/2003 Pines et al.
2003/0033382 A1 2/2003 Bogolea et al.
2003/0074198 A1 4/2003 Sussman
2003/0112931 A1 6/2003 Brown et al.
2003/0225682 A1 * 12/2003 Montemer 705/37
2004/0034561 A1 2/2004 Smith
2004/0121814 A1 * 6/2004 Creamer et al. 455/563
2004/0122941 A1 6/2004 Creamer et al.
2004/0198316 A1 10/2004 Johnson
2004/0204116 A1 10/2004 Ben Efraim et al.
2005/0004977 A1 1/2005 Roberts et al.
2005/0055310 A1 3/2005 Drewett et al.
2006/0203977 A1 9/2006 Erhart et al.
2006/0239422 A1 10/2006 Rinaldo et al.
2006/0259424 A1 11/2006 Turcotte et al.
2006/0262921 A1 11/2006 Eppel et al.
2006/0285662 A1 12/2006 Yin et al.
2007/0026852 A1 2/2007 Logan et al.
2007/0032247 A1 2/2007 Shaffer et al.
2007/0038513 A1 2/2007 Flax et al.
2007/0094109 A1 4/2007 Perry
2007/0123223 A1 5/2007 Letourneau et al.
2007/0239537 A1 10/2007 Protheroe et al.
2007/0243887 A1 10/2007 Bandhole et al.
2007/0298776 A1 12/2007 Arlene
2008/0066015 A1 3/2008 Blankenhorn
2008/0095330 A1 4/2008 Jin et al.
2008/0165948 A1 * 7/2008 Ryals et al. 379/266.1
2008/0226042 A1 9/2008 Singh
2008/0240374 A1 * 10/2008 Conway et al. 379/67.1
2008/0250334 A1 10/2008 Price
2009/0041215 A1 2/2009 Schmitt et al.
2009/0116414 A1 5/2009 Or et al.
2009/0136014 A1 5/2009 Bigue et al.
2009/0154666 A1 6/2009 Rios et al.
2009/0154686 A1 * 6/2009 Purdy et al. 379/265.09
2009/0202050 A1 8/2009 Berger et al.
2009/0207980 A1 8/2009 Berger et al.
2009/0207996 A1 8/2009 Berger et al.
2009/0225788 A1 9/2009 Kephart et al.
2009/0228908 A1 9/2009 Margis et al.
2009/0276441 A1 11/2009 Malik
2009/0276708 A1 11/2009 Smith et al.
2009/0280863 A1 11/2009 Shin et al.
2009/0285380 A1 11/2009 Chen et al.
2010/0007028 A1 1/2010 Fachmann et al.
2010/0021030 A1 1/2010 Collins et al.
2010/0049654 A1 2/2010 Pilo et al.
2010/0087175 A1 4/2010 Roundtree
2010/0100377 A1 4/2010 Madhavapeddi et al.
2010/0166158 A1 7/2010 Costello et al.
2010/0172481 A1 7/2010 Canu et al.
2010/0189250 A1 7/2010 Williams et al.
2011/0009096 A1 1/2011 Rotsztein et al.
2011/0014952 A1 1/2011 Minton
2011/0060683 A1 3/2011 Salmon Rock et al.
2011/0091021 A1 4/2011 Adkar et al.
2011/0099116 A1 4/2011 Gabel
2011/0225330 A1 * 9/2011 Lavian et al. 710/63
2011/0276408 A1 11/2011 Toole
2012/0063574 A1 * 3/2012 Or-Bach et al. 379/88.23
2013/0022181 A1 * 1/2013 Or-Bach et al. 379/88.11
2013/0022183 A1 * 1/2013 Or-Bach et al. 379/88.23
2013/0022191 A1 * 1/2013 Or-Bach et al. 379/218.01

FOREIGN PATENT DOCUMENTS

EP 1351477 A1 10/2003
EP 1120954 A3 6/2005
EP 1545101 A3 12/2005
EP 774853 B1 5/2006
EP 1874018 A1 1/2008
JP 2004274425 A 9/2004
WO 9819259 A1 5/1998
WO 9840826 A3 12/1998

(56) **References Cited**

FOREIGN PATENT DOCUMENTS

WO	9856158	A3	3/1999
WO	9848551	A3	4/1999
WO	0131497	A1	5/2001
WO	0157851	A1	8/2001
WO	0165871	A1	9/2001
WO	9820409	A8	11/2001
WO	0217604	A1	2/2002
WO	2004049306	A1	6/2004
WO	2004064299	A3	7/2005
WO	2007012831	A1	2/2007
WO	2007081929	A3	1/2008
WO	2008086320	A1	7/2008
WO	2009006173	A3	3/2009
WO	2009100477	A1	8/2009

OTHER PUBLICATIONS

Damhuis, M., et al., "A Multimodal Consumer Information Server with IVR Menu," 2nd IEEE Workshop on Interactive Voice Technology for Telecommunications Applications (IVTTA94): pp. 73-76, Kyoto, Japan (Sep. 1994).

Shah, S.AA., et al., "Interactive Voice Response with Pattern Recognition Based on Artificial Neural Network Approach," International Conference on Emerging Technologies: pp. 249-252, (Nov. 2007).

Trihandoyo, A., et al., "A real-time speech recognition architecture for a multi-channel interactive voice response system," International Conference on Acoustics, Speech, and Signal Processing vol. 4: pp. 2687-2690,(1995).

Hattori, S., et al., "A multimedia intelligent message communication system for distributed coordination environments," Electronics & Communications in Japan, Part I—Communications, vol. 76, No. 1, pp. 11-23 (1993).

Patent abstracts of Japan, vol. 097, No. 001, Jan. 31, 1997 & JP 08 242307 A (Canon Inc), Sep. 17, 1996.

Kalva, H., et al., "Delivering Object-Based Audio-Visual Services," IEEE Transactions on Consumer Electronics, vol. 45, No. 4, pp. 1108-1111, (1999).

Schmandt, "Phoneshell: the telephone as computer terminal," Proceedings of first ACM International Conference on Multimedia, Anaheim, CA, US, pp. 373-381, (1993).

Himberg, J., et al., "Time Series Segmentation for Context Recognition in Mobile Devices", IEEE, 203-210, (2001).

Chris Schmandt and Stephen Casner, "Phonetool: Integrating Telephones and Workstations," IEEE Communication Society, Nov. 27-30, pp. 0970-0974, (1989).

Basinger, R. G., et al., "Calling Card Service—Overall Description and Operational Characteristics", The Bell System Technical Journal, (1982).

Cadiz et al. "Designing and Deploying an Information Awareness interface" CSCW'02, Nov. 2002, ACM, pp. 314-323.

Corcoran et al. disclose "User interface technologies for home appliances and networks", IEEE Trans. Consumer Elect.; pp. 679-685, (1998).

Nancy Friedrich, "Graphical-User-Interface Module Eases Integration," Wireless Systems Design, Oct. 2004, 1 page.

Balachandran, R., et al., "Dialog System for Mixed Initiative One-Turn Address entry and Error Recovery," Proceedings of SIGDIAL 2009, the 10th Annual Meeting of the Special Interest Group in Discourse and Dialogue, pp. 152-155, Queen Mary University of London, Association of Computational Logistics, (2009).

* cited by examiner

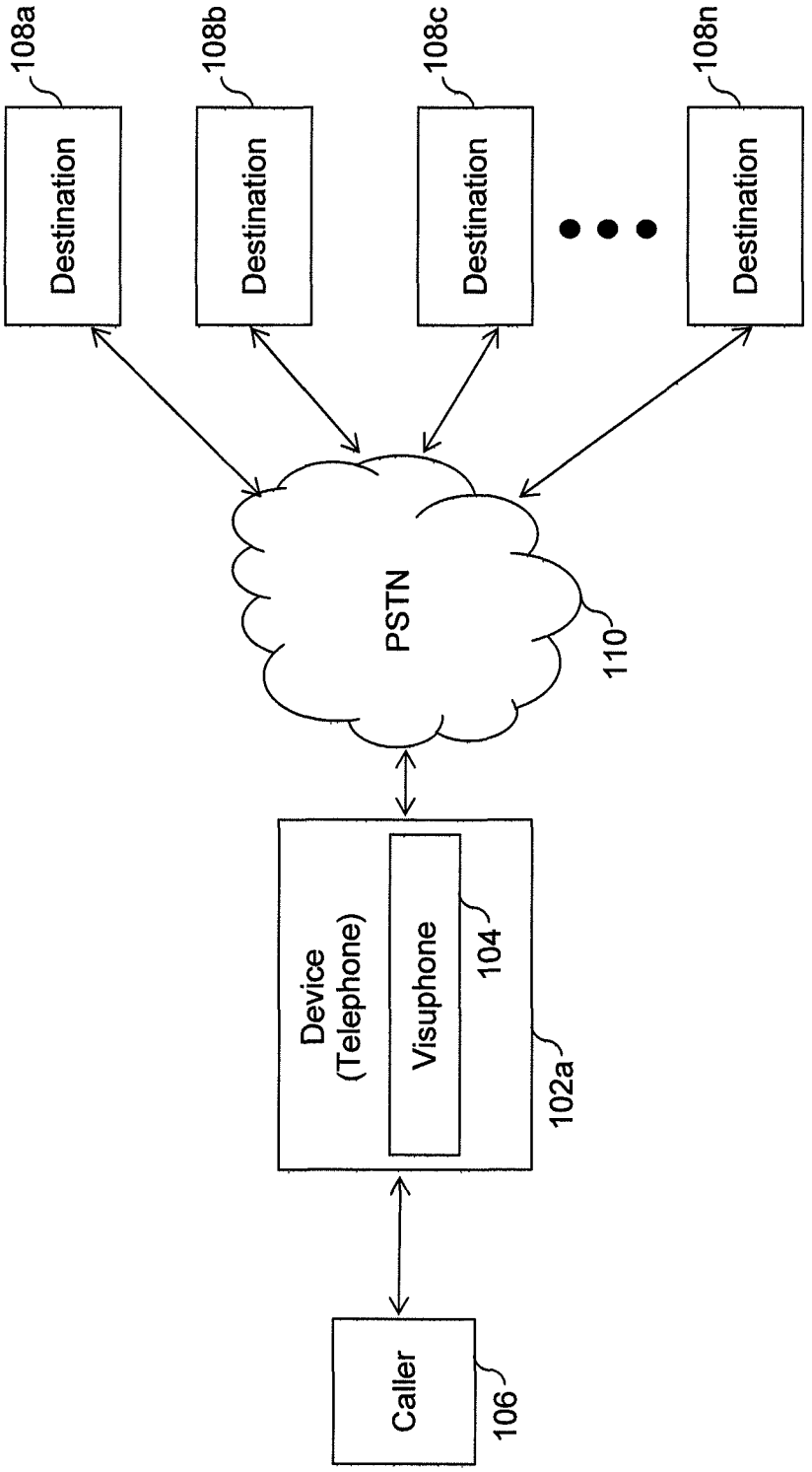

108a
Destination
108b
Destination
108c
Destination
108n
Destination
PSTN
110
Device
(Telephone)
Visuphone
104
102a
Caller
106

FIG. 1A

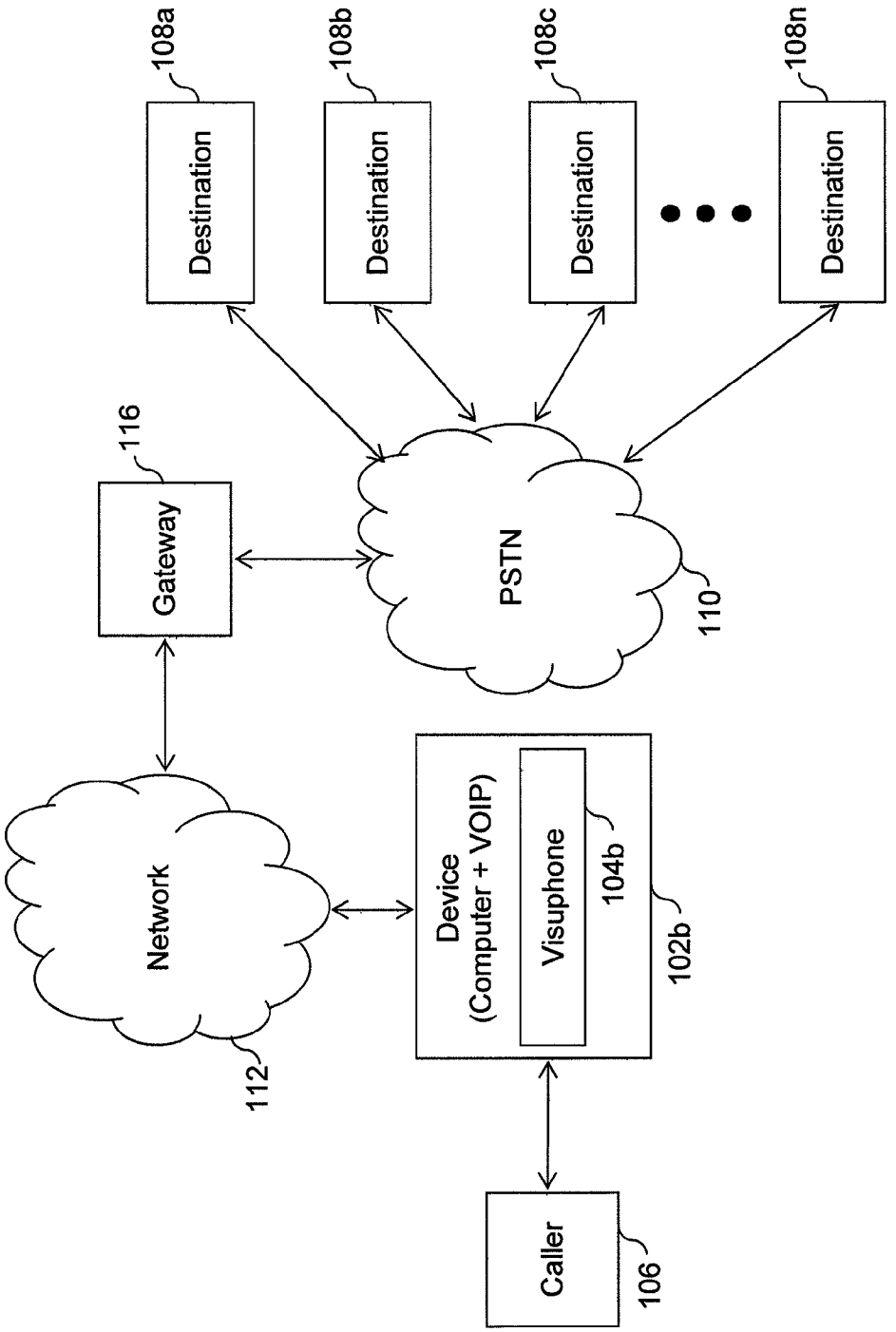

108a
Destination
108b
Destination
108c
Destination
108n
Destination
116
Gateway
PSTN
110
Network
112
Device
(Computer + VOIP)
Visuphone
104b
102b
Caller
106

FIG. 1B

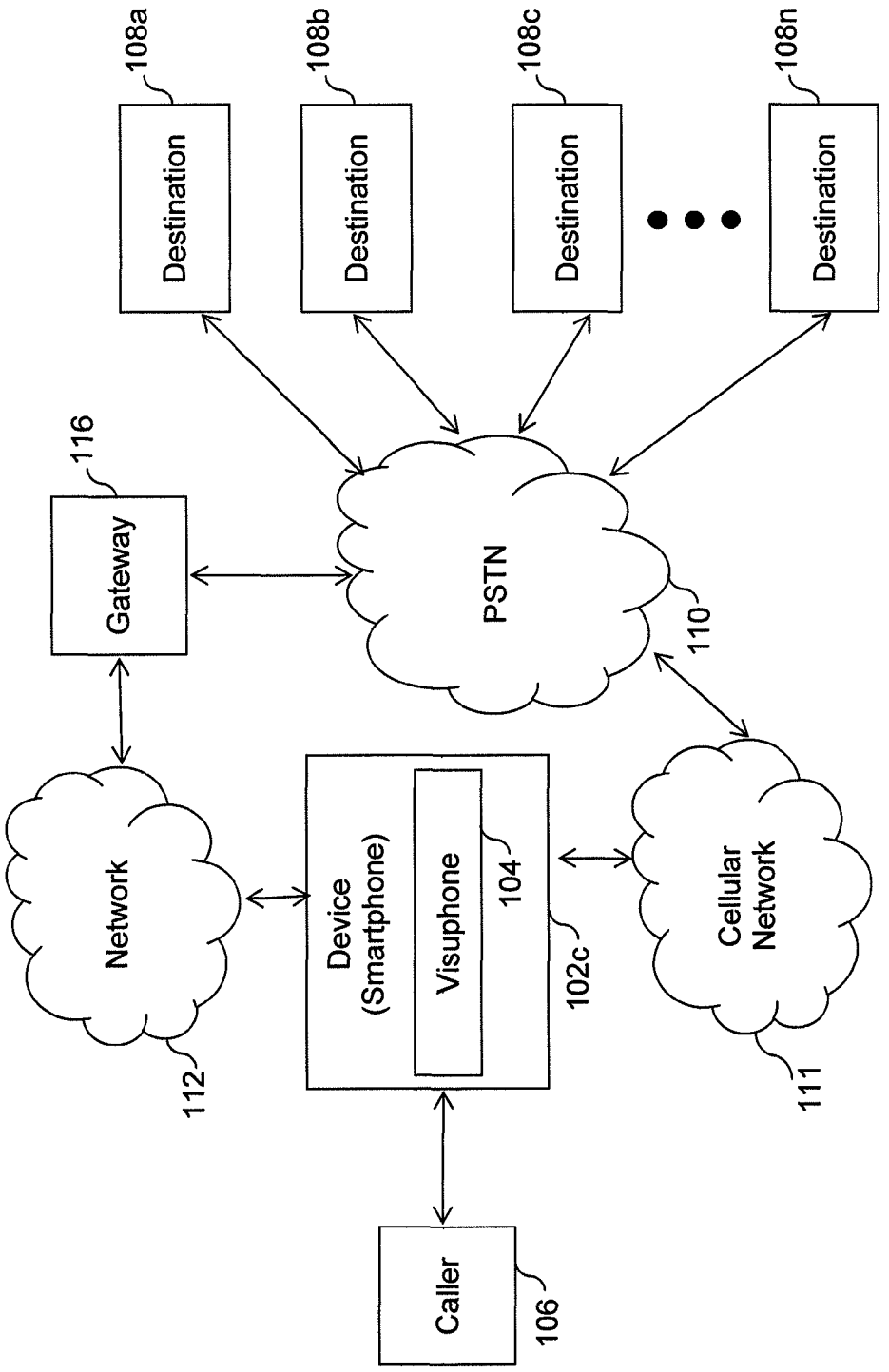

108a
Destination
108b
Destination
108c
Destination
108n
Destination
116
Gateway
PSTN
110
Network
112
Device
(Smartphone)
Visuphone
104
102c
Cellular
Network
111
Caller
106

FIG. 1C

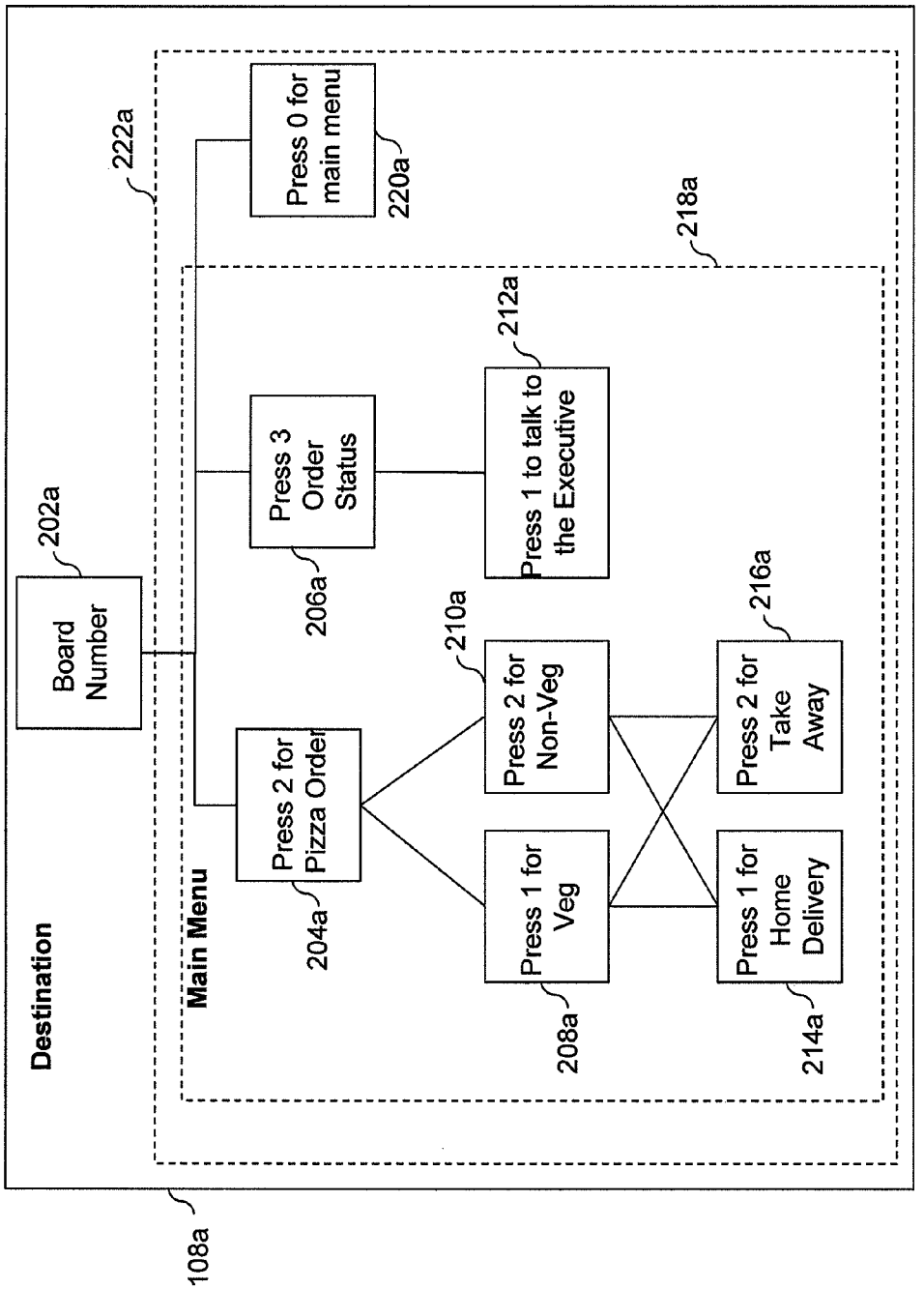

Destination
Board Number
202a
Main Menu
Press 2 for Pizza Order
204a
Press 3 Order Status
206a
Press 1 to talk to the Executive
212a
Press 2 for Non-Veg
210a
Press 1 for Veg
208a
Press 2 for Take Away
216a
Press 1 for Home Delivery
214a
Press 0 for main menu
220a
222a
218a
108a

FIG. 2A

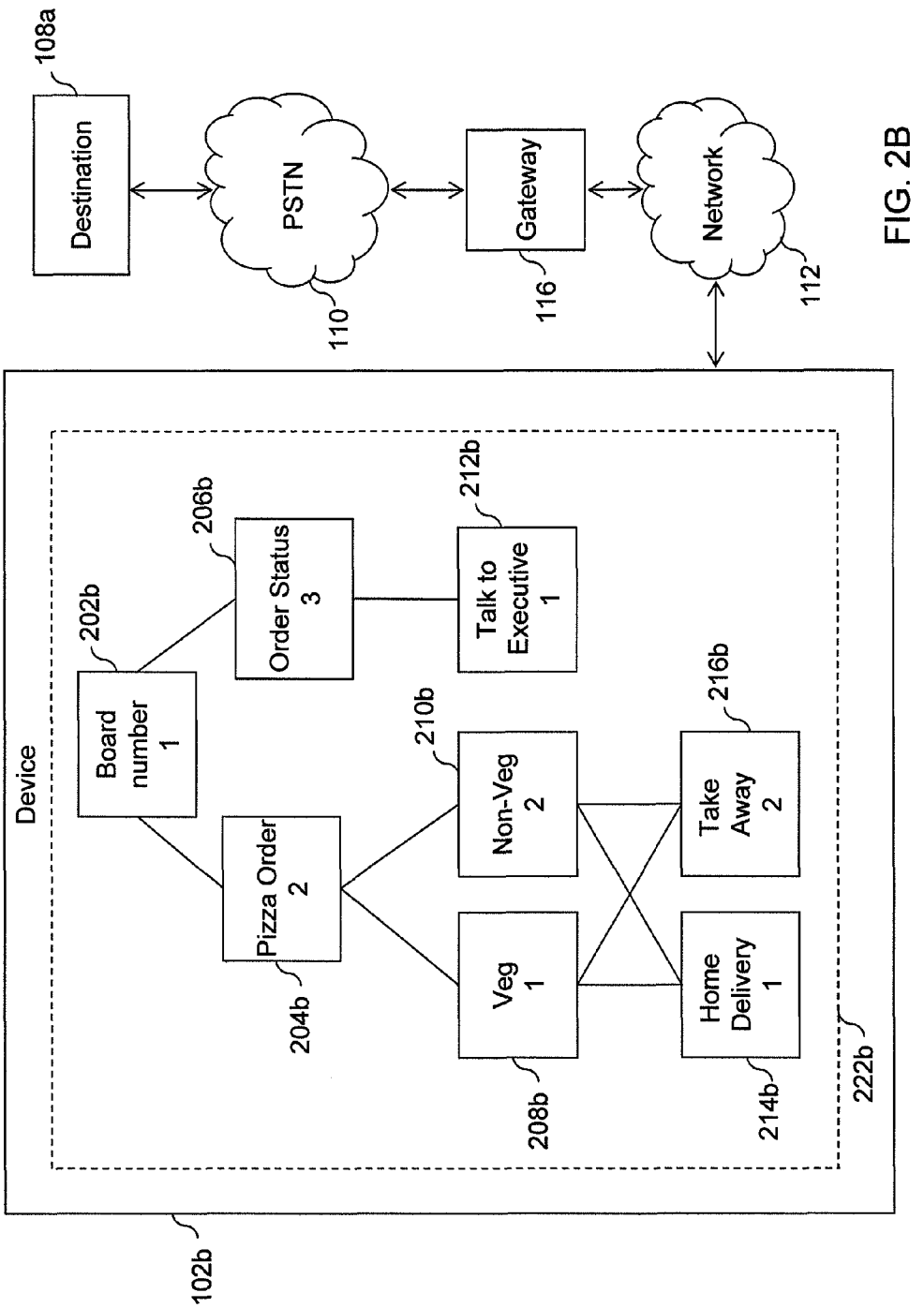

108a
Destination
PSTN
110
Gateway
116
Network
112
Device
102b
222b
202b
Board number 1
206b
Order Status 3
212b
Talk to Executive 1
204b
Pizza Order 2
210b
Non-Veg 2
208b
Veg 1
216b
Take Away 2
214b
Home Delivery 1

FIG. 2B

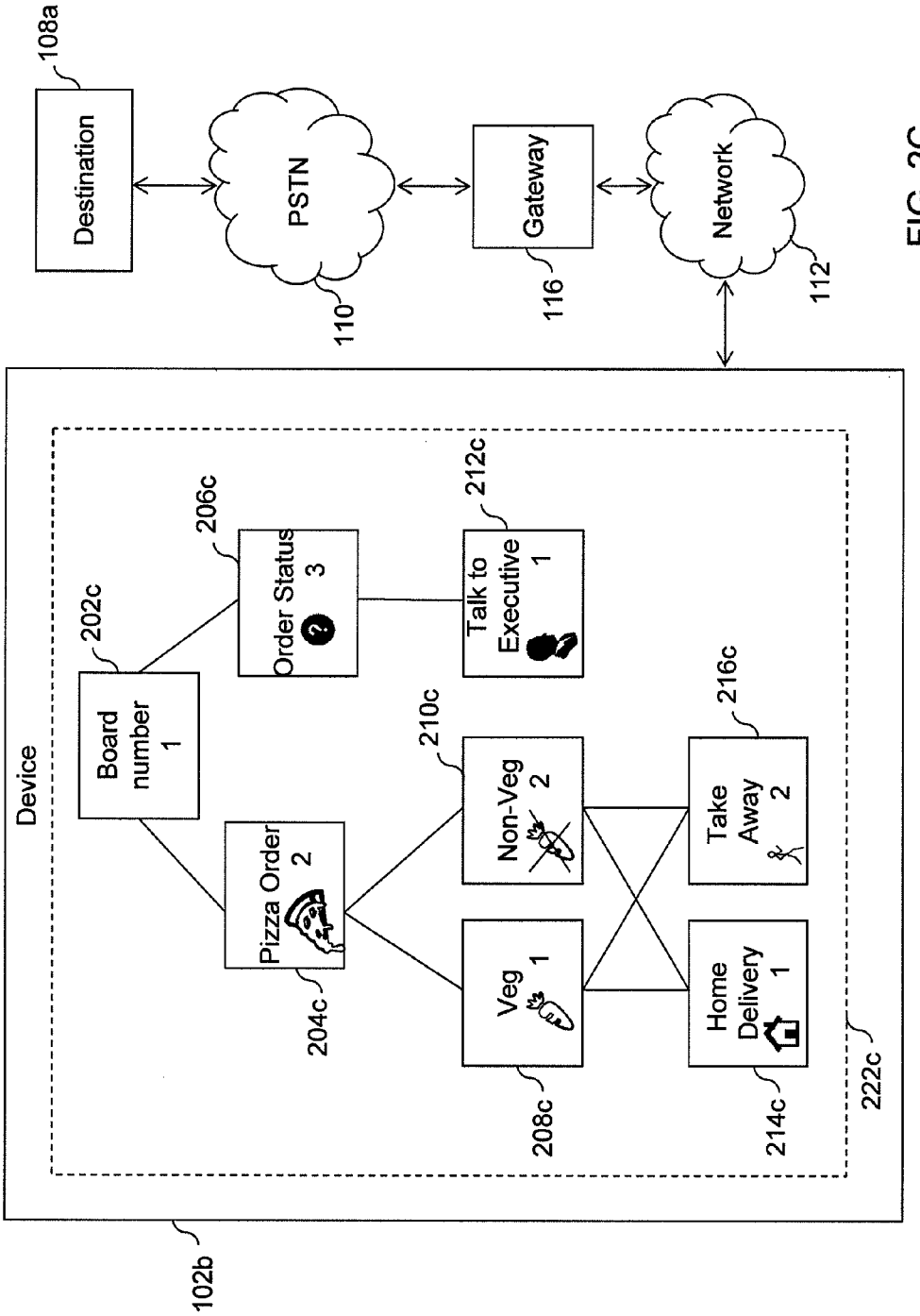

108a
Destination
PSTN
110
Gateway
116
Network
112
Device
102b
Board number 1
202c
Pizza Order 2
204c
Order Status 3
206c
Talk to Executive 1
212c
Non-Veg 2
210c
Veg 1
208c
Take Away 2
216c
Home Delivery 1
214c
222c

FIG. 2C

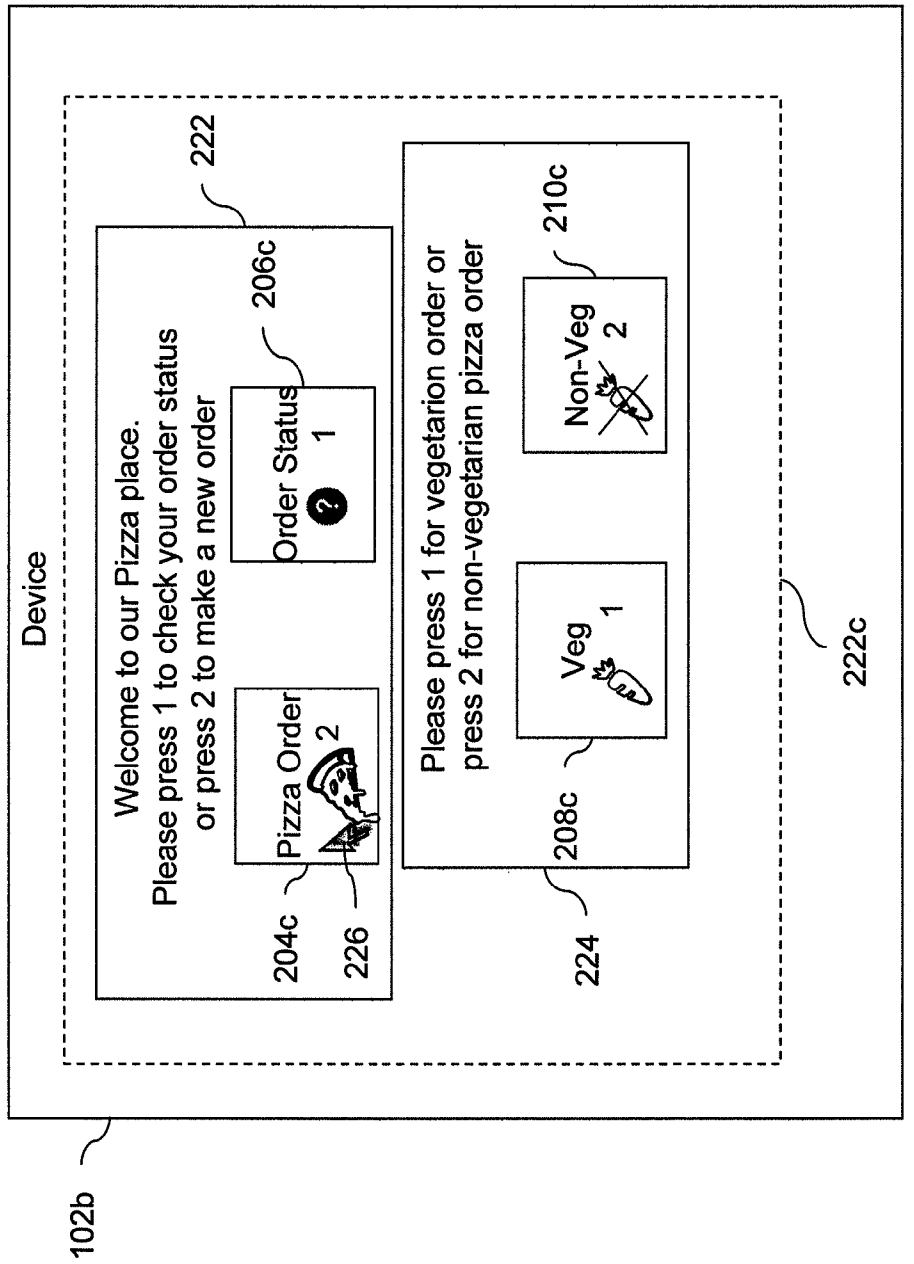

Device
Welcome to our Pizza place.
Please press 1 to check your order status
or press 2 to make a new order
Pizza Order 2
Order Status 1
Please press 1 for vegetarion order or
press 2 for non-vegetarian pizza order
Veg 1
Non-Veg 2
102b
204c
206c
208c
210c
222
222c
224
226

FIG. 2D

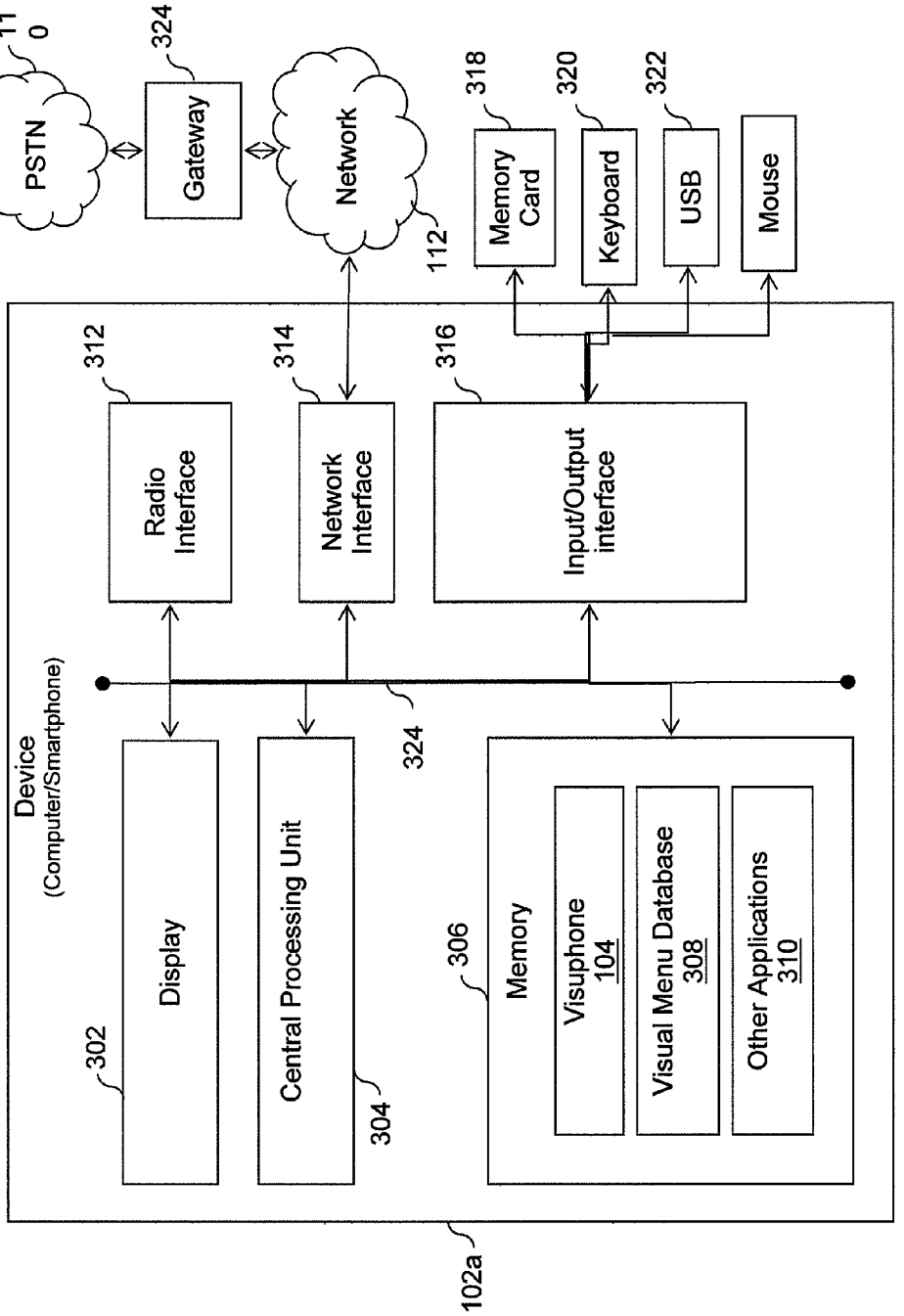

110
PSTN
324
Gateway
Network
112
318
Memory Card
320
Keyboard
322
USB
Mouse
312
Radio Interface
314
Network Interface
316
Input/Output interface
Device
(Computer/Smartphone)
324
302
Display
Central Processing Unit
304
306
Memory
Visuphone 104
Visual Menu Database 308
Other Applications 310
102a

FIG. 3A

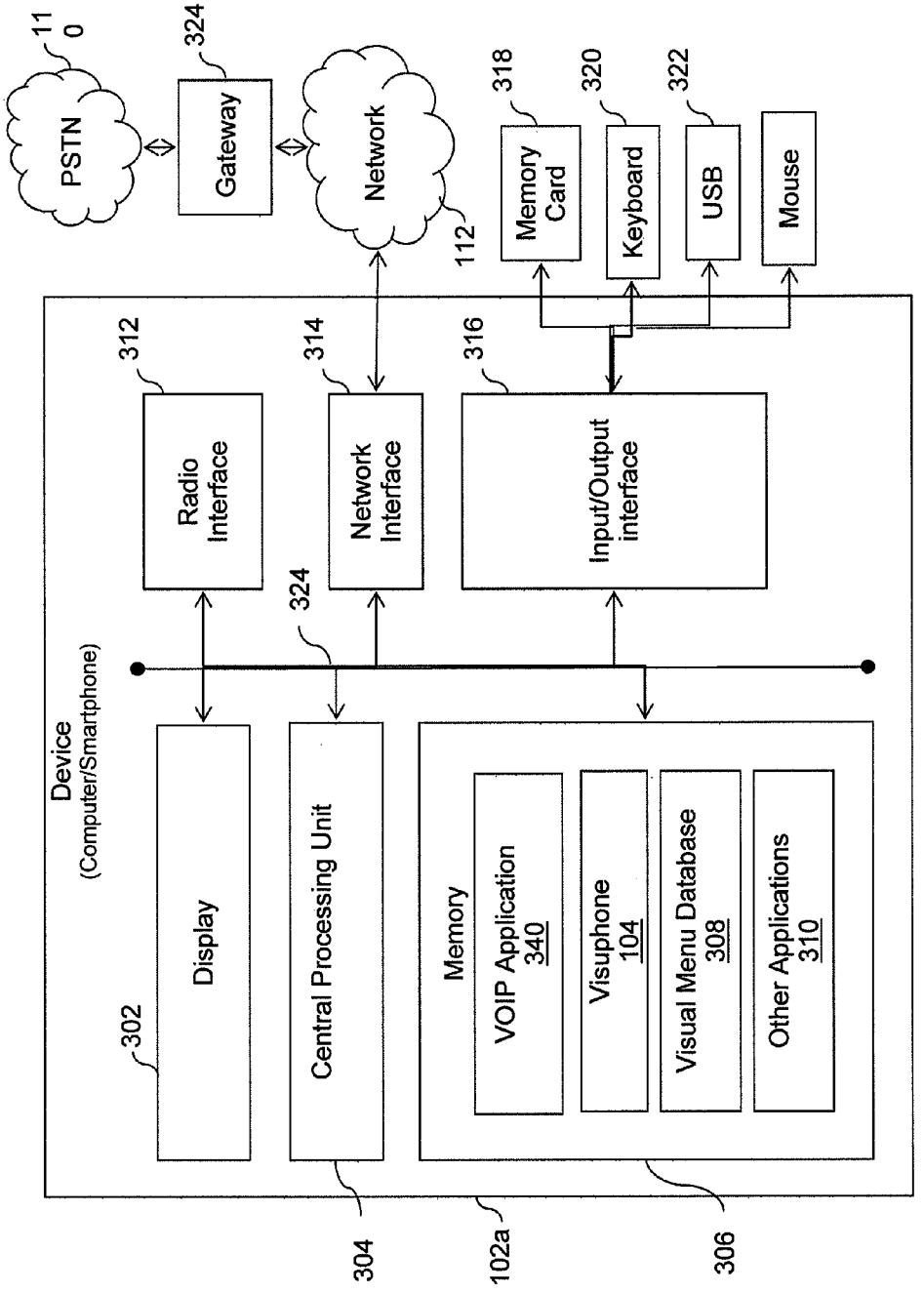

110
PSTN
324
Gateway
Network
112
318
Memory Card
320
Keyboard
322
USB
Mouse
312
Radio Interface
314
Network Interface
316
Input/Output interface
324
Device
(Computer/Smartphone)
302
Display
Central Processing Unit
Memory
VOIP Application 340
Visuphone 104
Visual Menu Database 308
Other Applications 310
304
102a
306

FIG. 3B

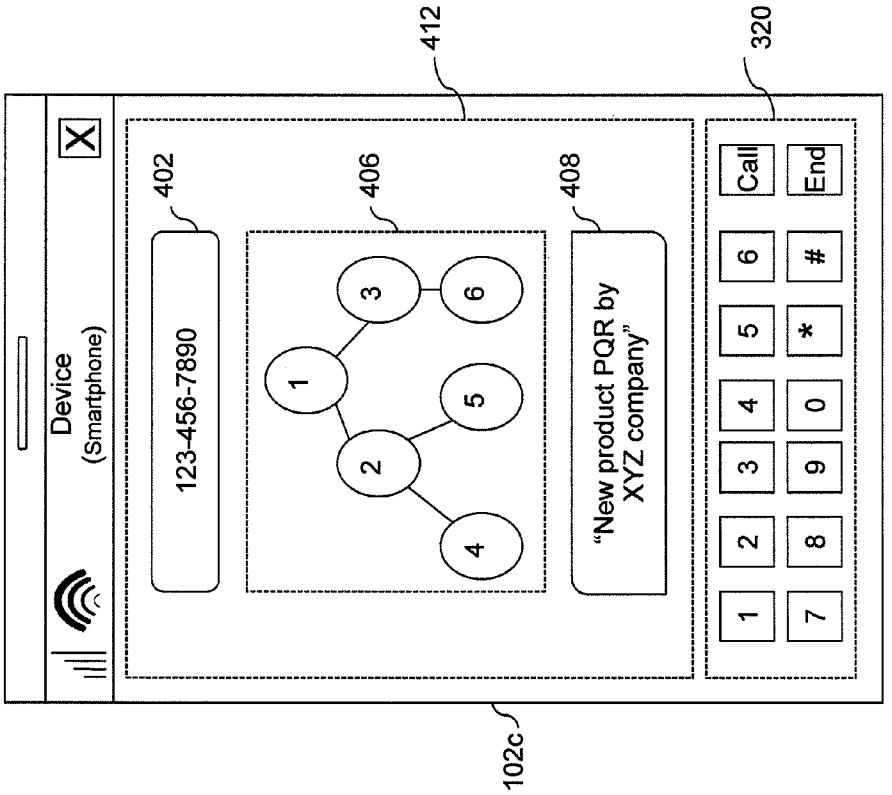

412
320
Device
(Smartphone)
402
123-456-7890
406
408
"New product PQR by XYZ company"
1
2
3
4
5
6
7
8
9
0
*
#
Call
End
102c

FIG. 4

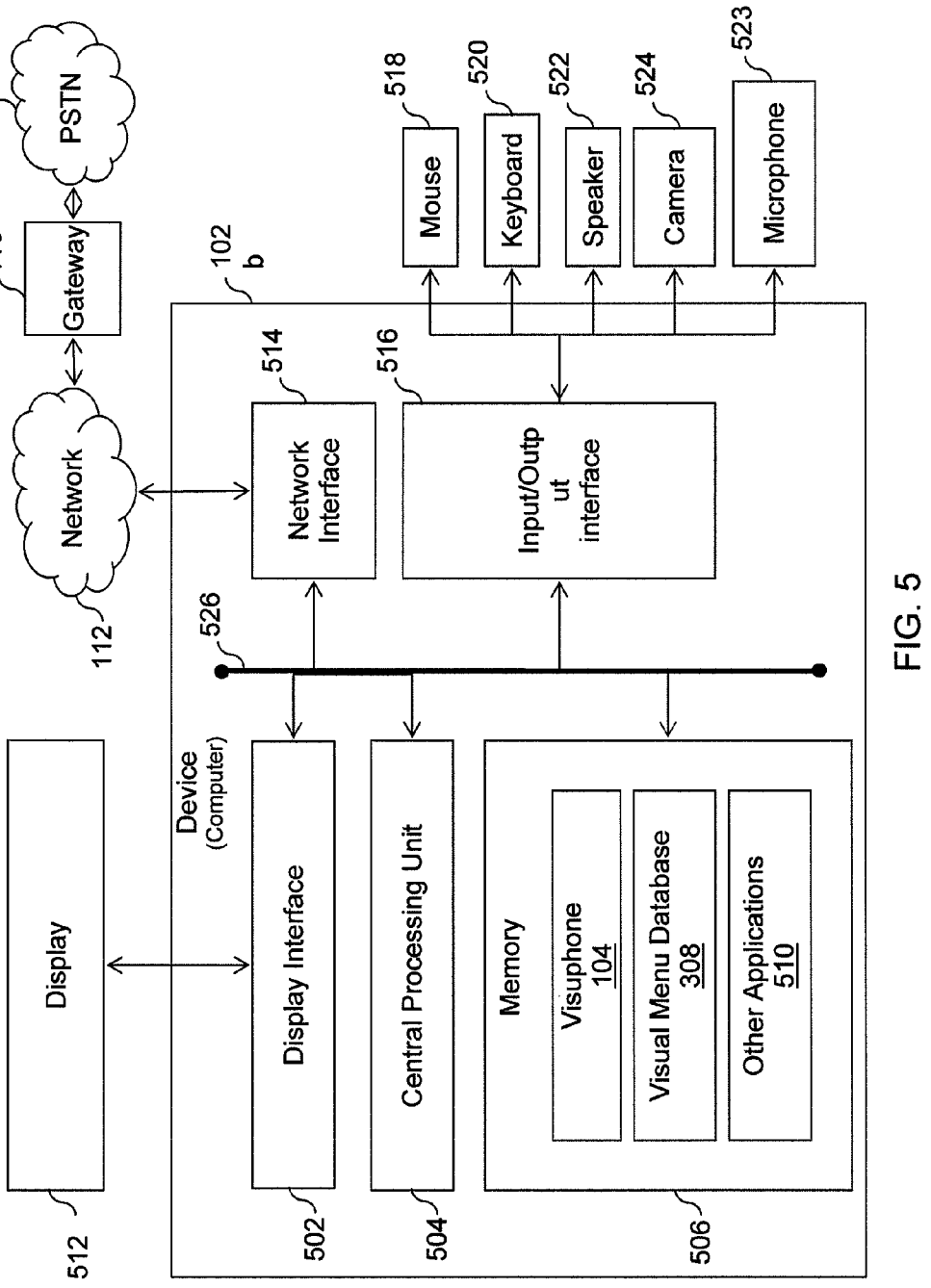

110
PSTN
116
Gateway
Network
112
102
b
518
Mouse
520
Keyboard
522
Speaker
524
Camera
523
Microphone
514
Network Interface
516
Input/Output interface
526
Device (Computer)
Display
512
Display Interface
502
Central Processing Unit
504
Memory
Visuphone 104
Visual Menu Database 308
Other Applications 510
506

FIG. 5

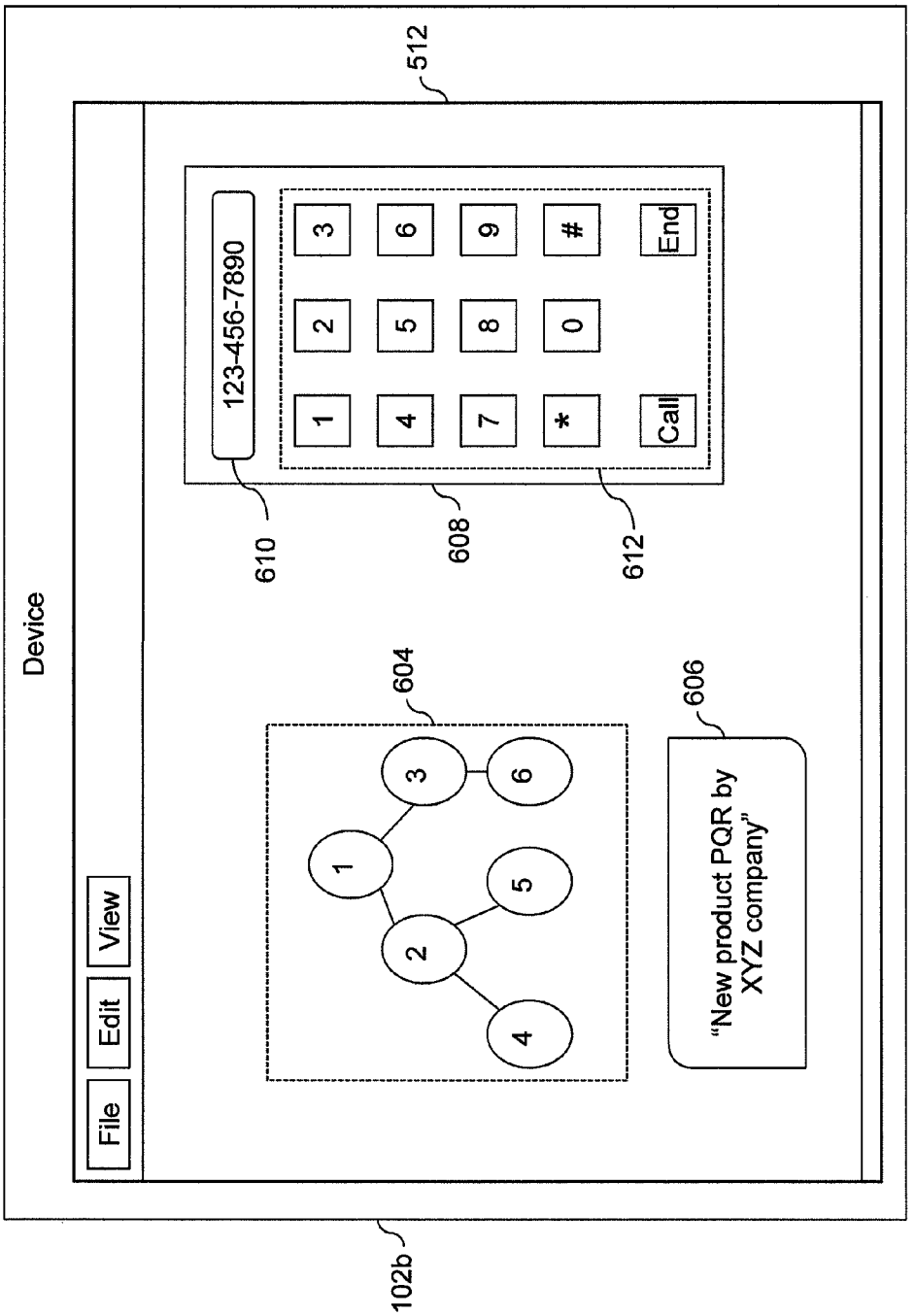

Device
File
Edit
View
512
123-456-7890
1
2
3
4
5
6
7
8
9
*
0
#
Call
End
610
608
612
604
606
"New product PQR by XYZ company"
102b

FIG.6

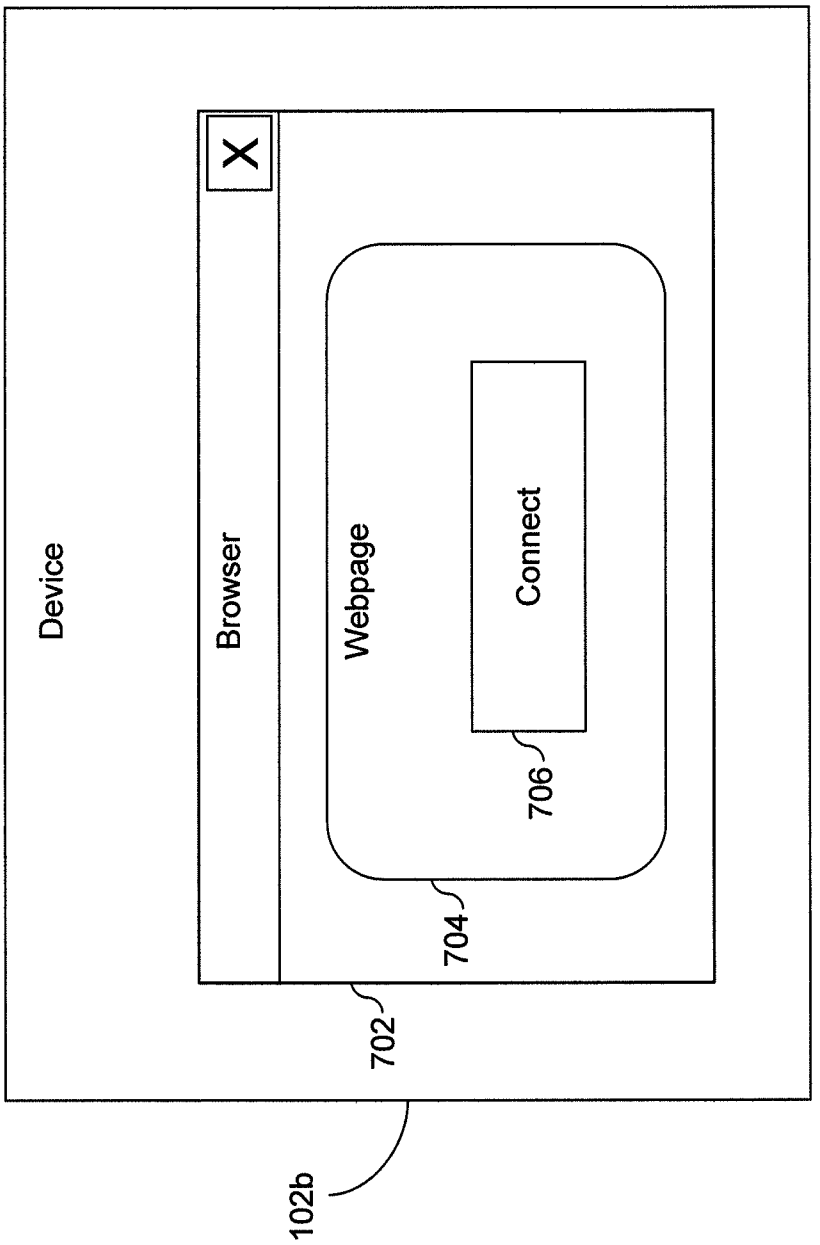


FIG. 7

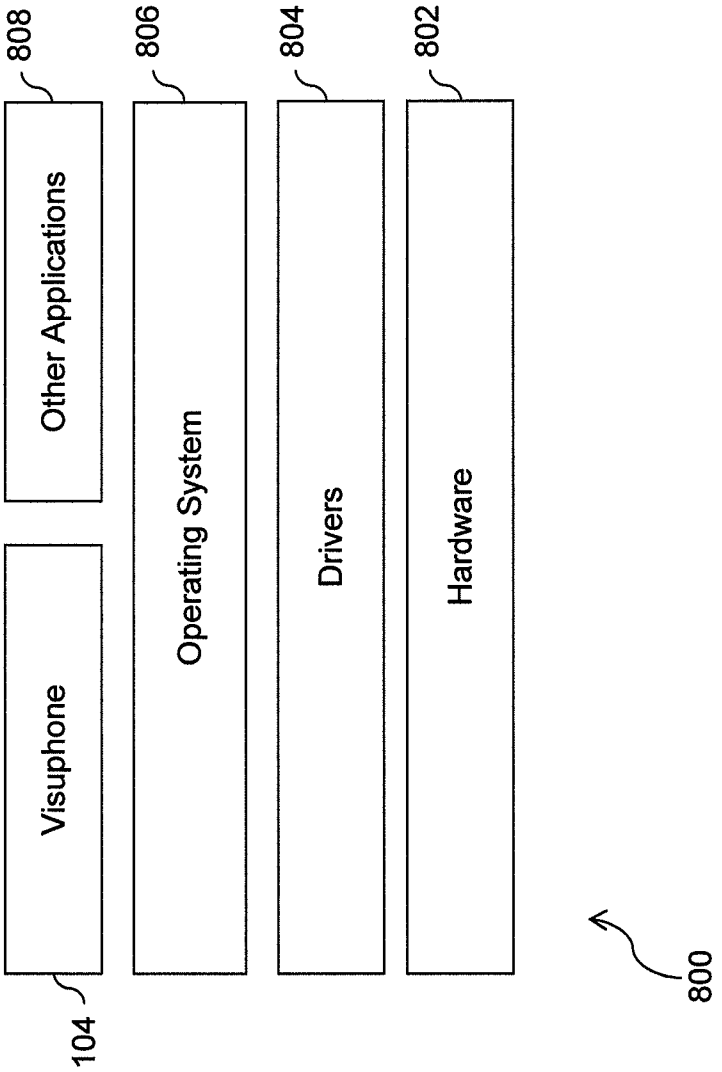

808
806
804
802
Other Applications
Operating System
Drivers
Hardware
Visuphone
104
800

FIG. 8

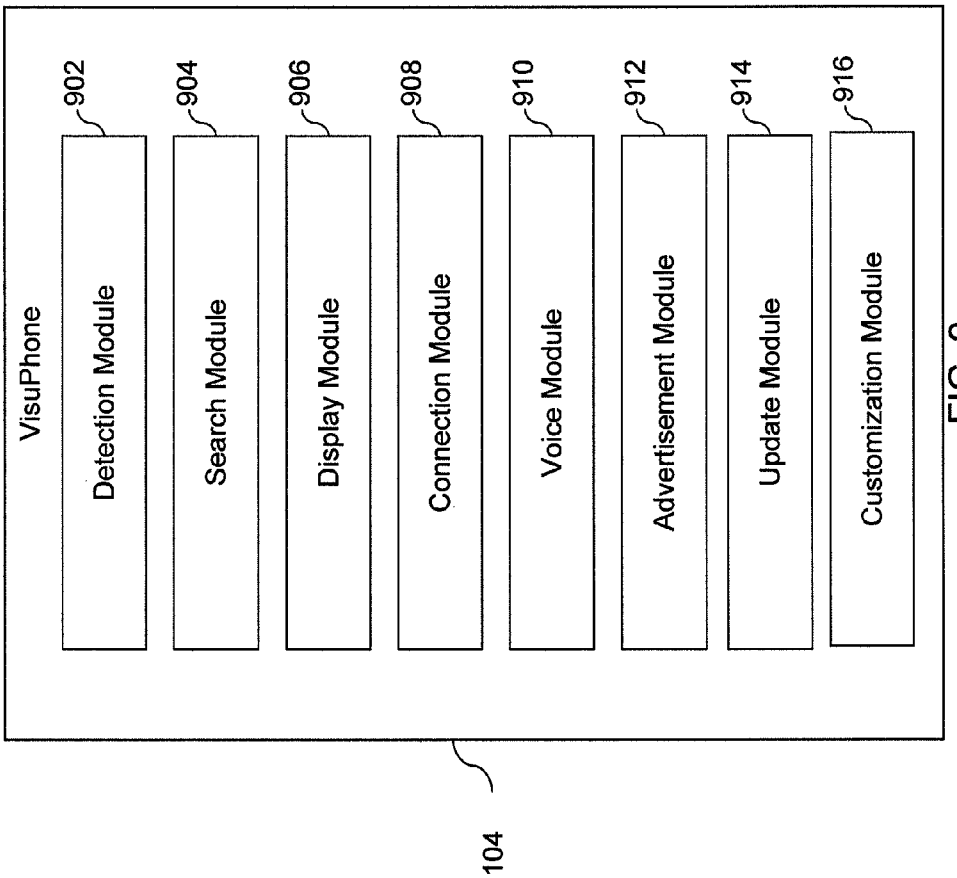

VisuPhone
902
Detection Module
904
Search Module
906
Display Module
908
Connection Module
910
Voice Module
912
Advertisement Module
914
Update Module
916
Customization Module
104

FIG. 9

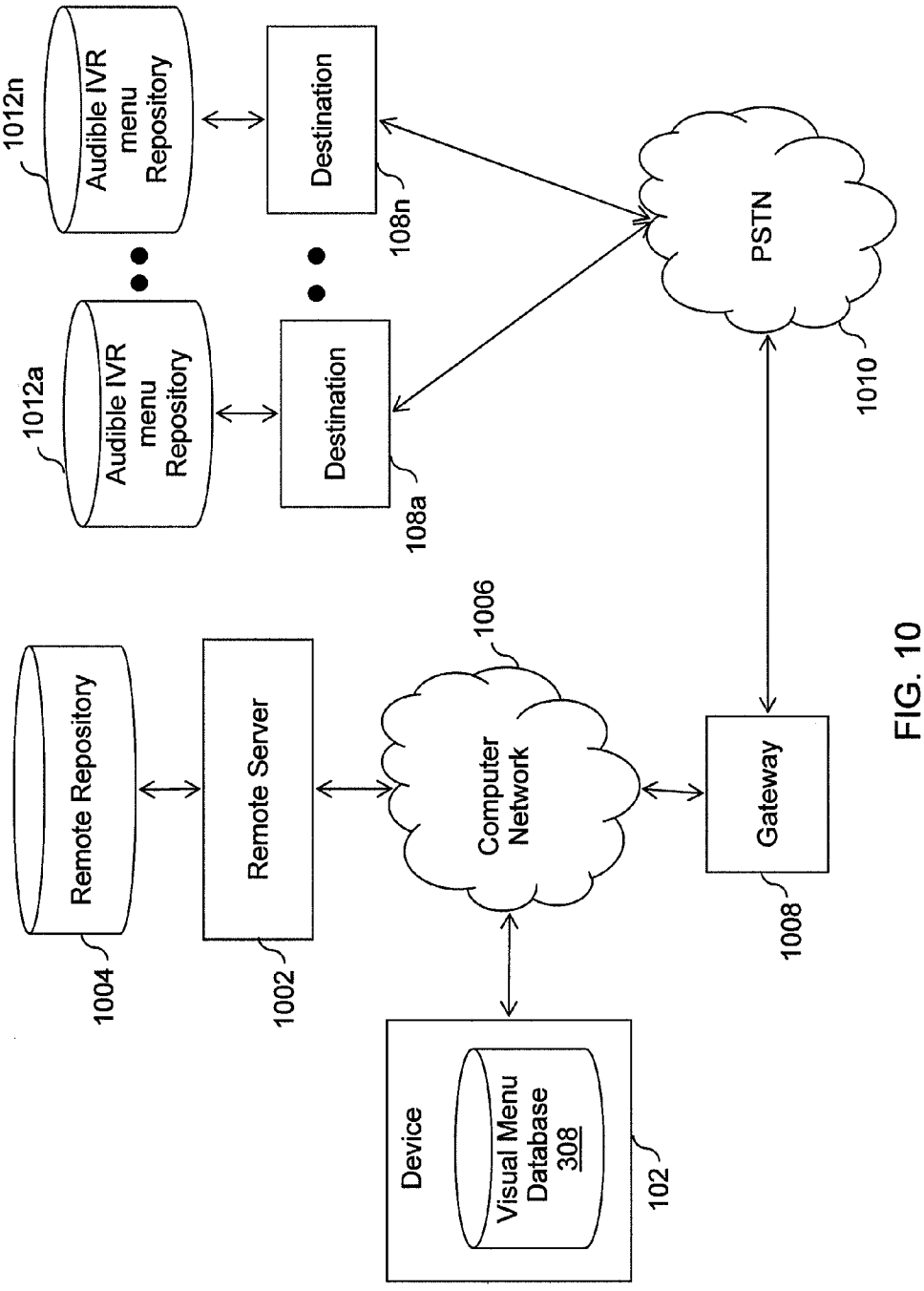

Audible IVR menu Repository
1012n
Destination
108n
Audible IVR menu Repository
1012a
Destination
108a
PSTN
1010
Remote Repository
1004
Remote Server
1002
Computer Network
1006
Gateway
1008
Device
Visual Menu Database 308
102

FIG. 10

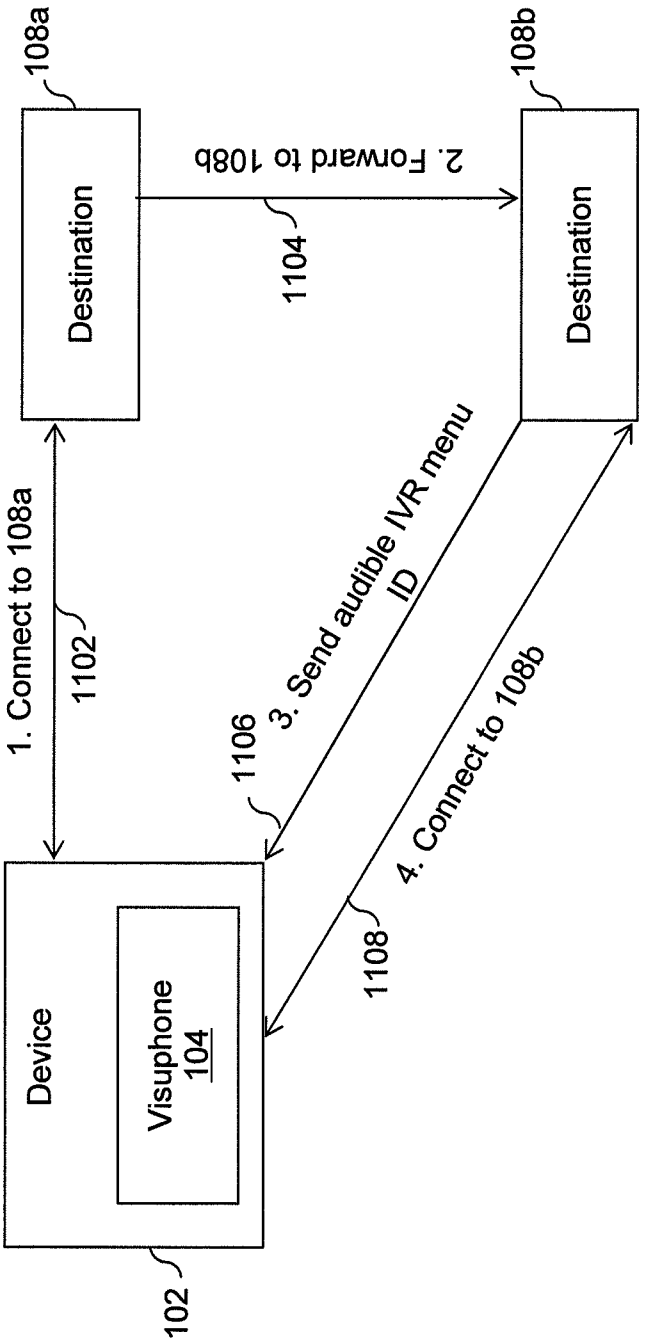

108a
Destination
2. Forward to 108b
1104
108b
Destination
1. Connect to 108a
1102
1106
3. Send audible IVR menu ID
4. Connect to 108b
1108
Device
Visuphone 104
102

FIG. 11

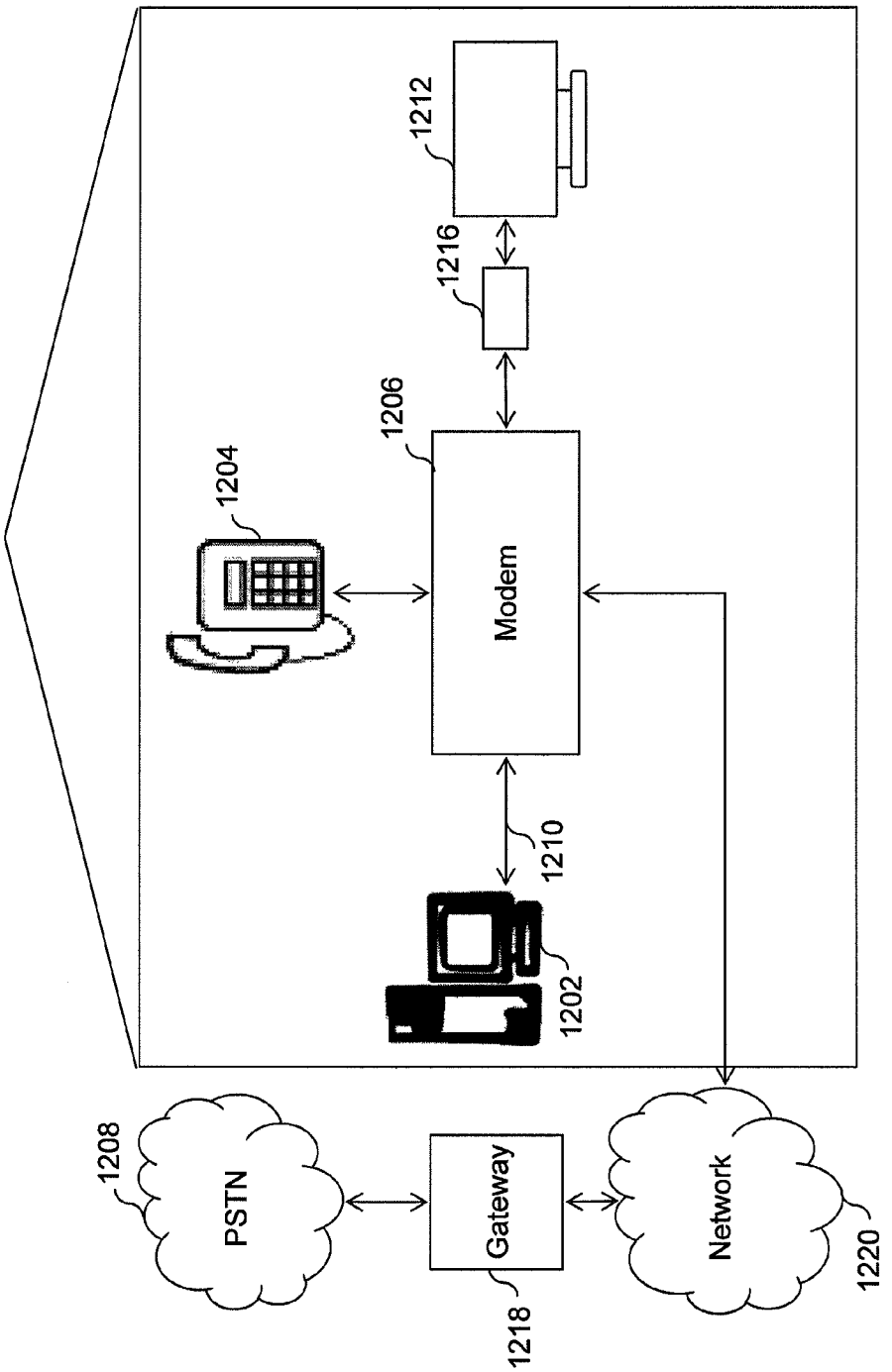

1212
1216
1206
1204
Modem
1210
1202
1208
PSTN
Gateway
Network
1218
1220

FIG. 12

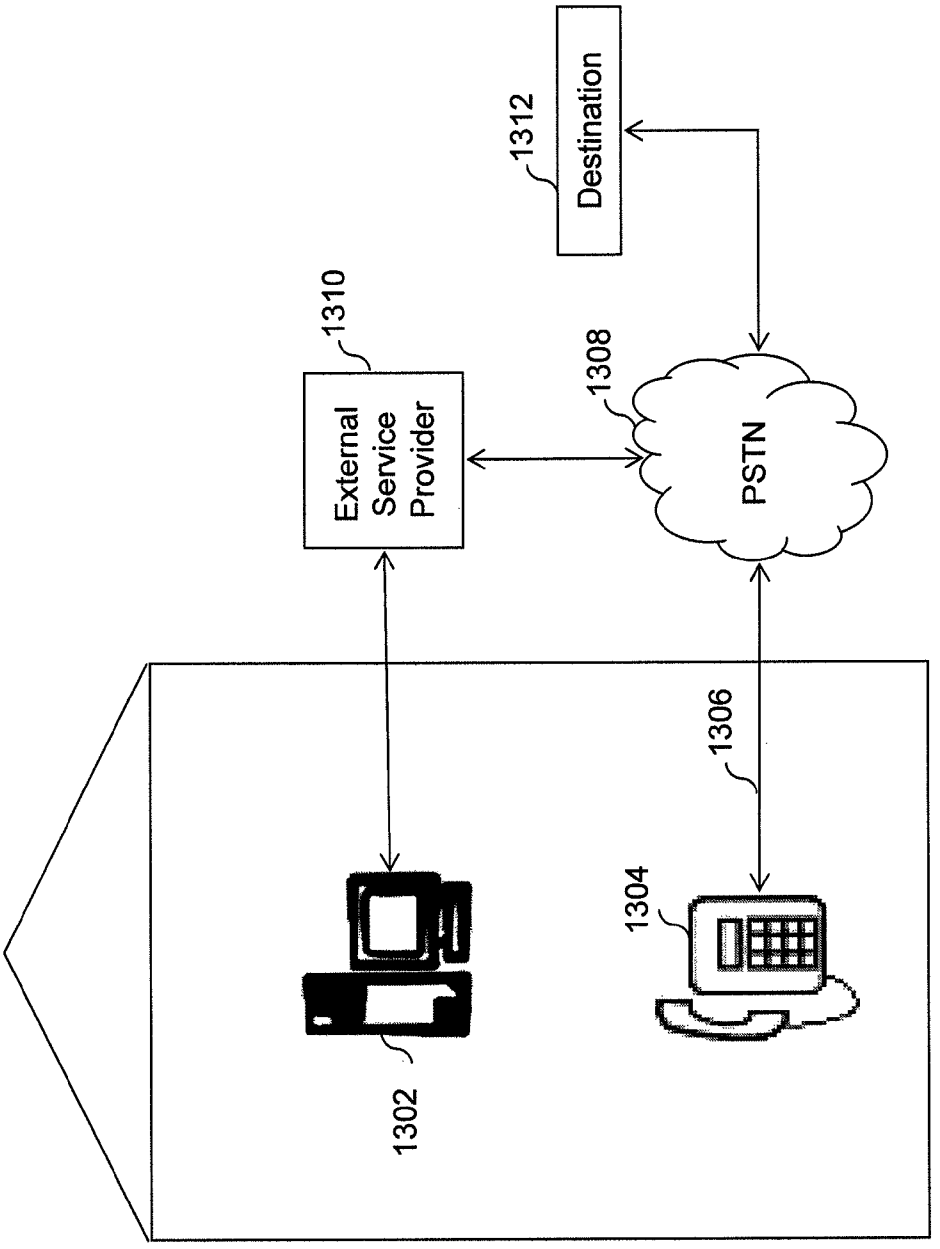

1312
Destination
1310
External Service Provider
1308
PSTN
1306
1304
1302

FIG. 13

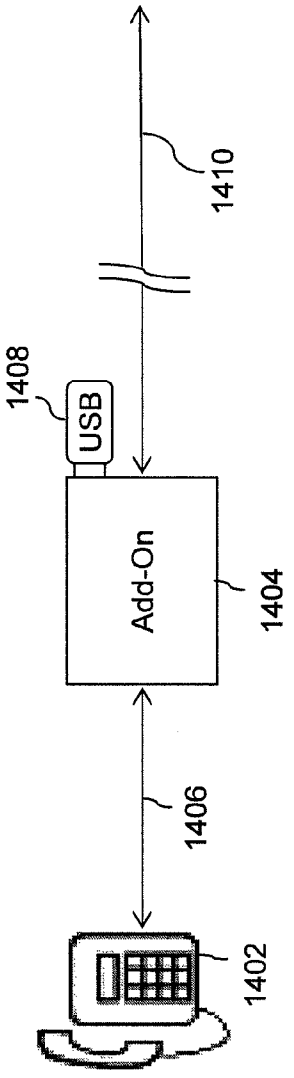


FIG. 14A

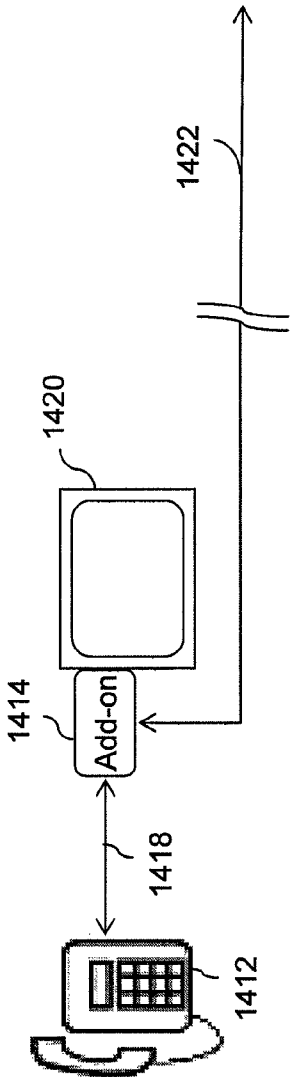


FIG. 14B

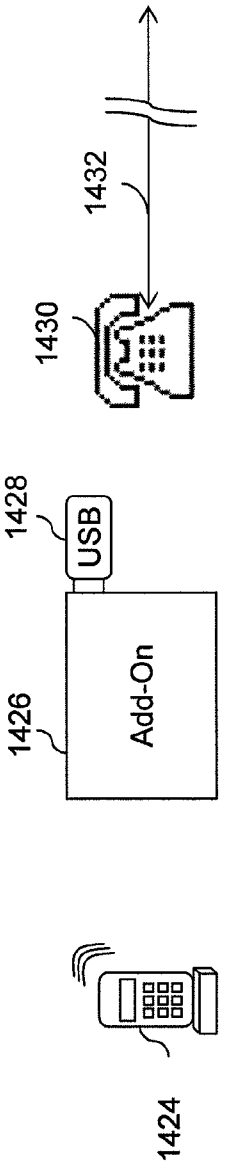


FIG. 14C

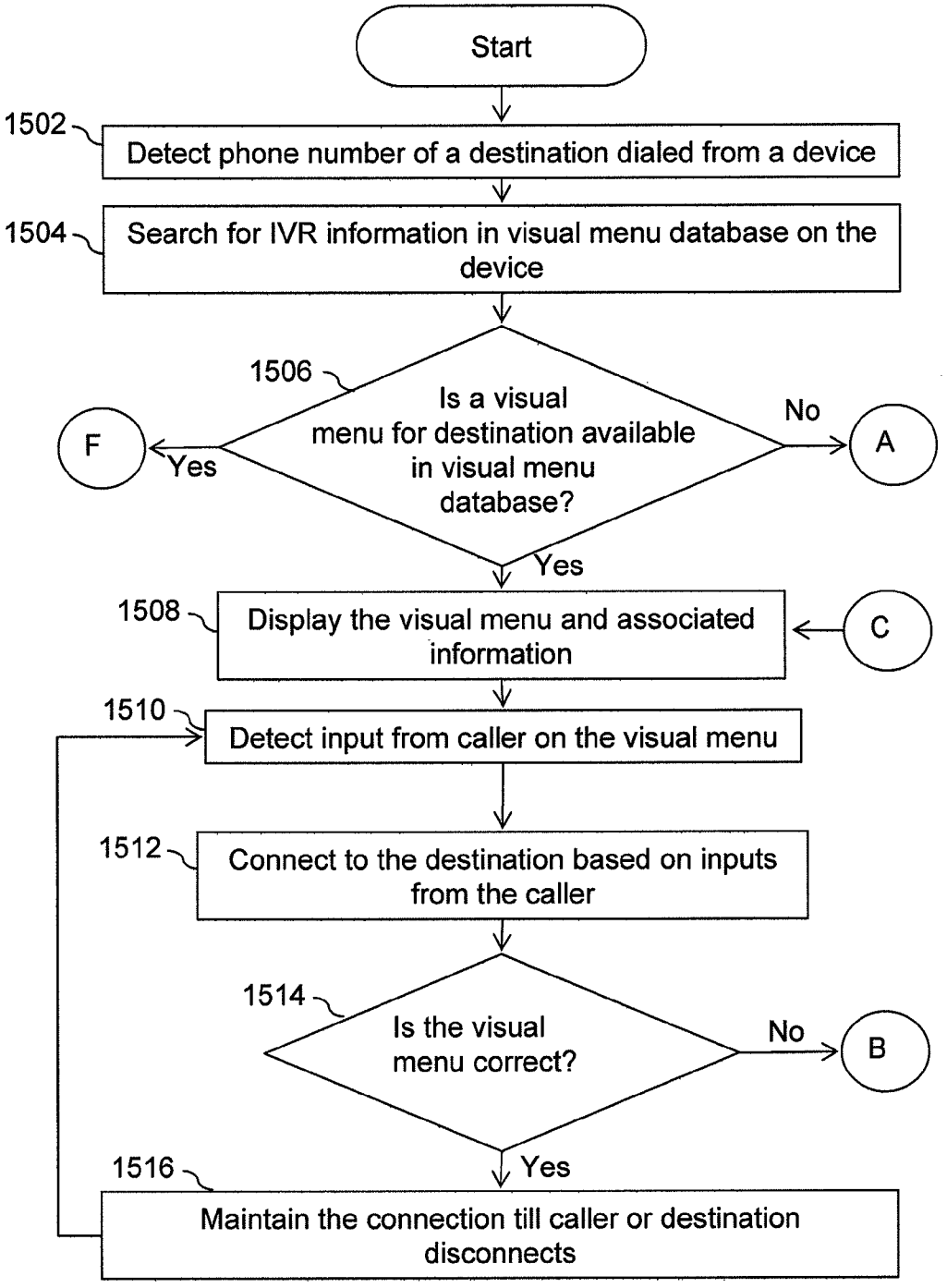

Start
1502
Detect phone number of a destination dialed from a device
1504
Search for IVR information in visual menu database on the device
1506
Is a visual menu for destination available in visual menu database?
Yes
No
F
A
Yes
1508
Display the visual menu and associated information
C
1510
Detect input from caller on the visual menu
1512
Connect to the destination based on inputs from the caller
1514
Is the visual menu correct?
No
B
Yes
1516
Maintain the connection till caller or destination disconnects

FIG. 15A

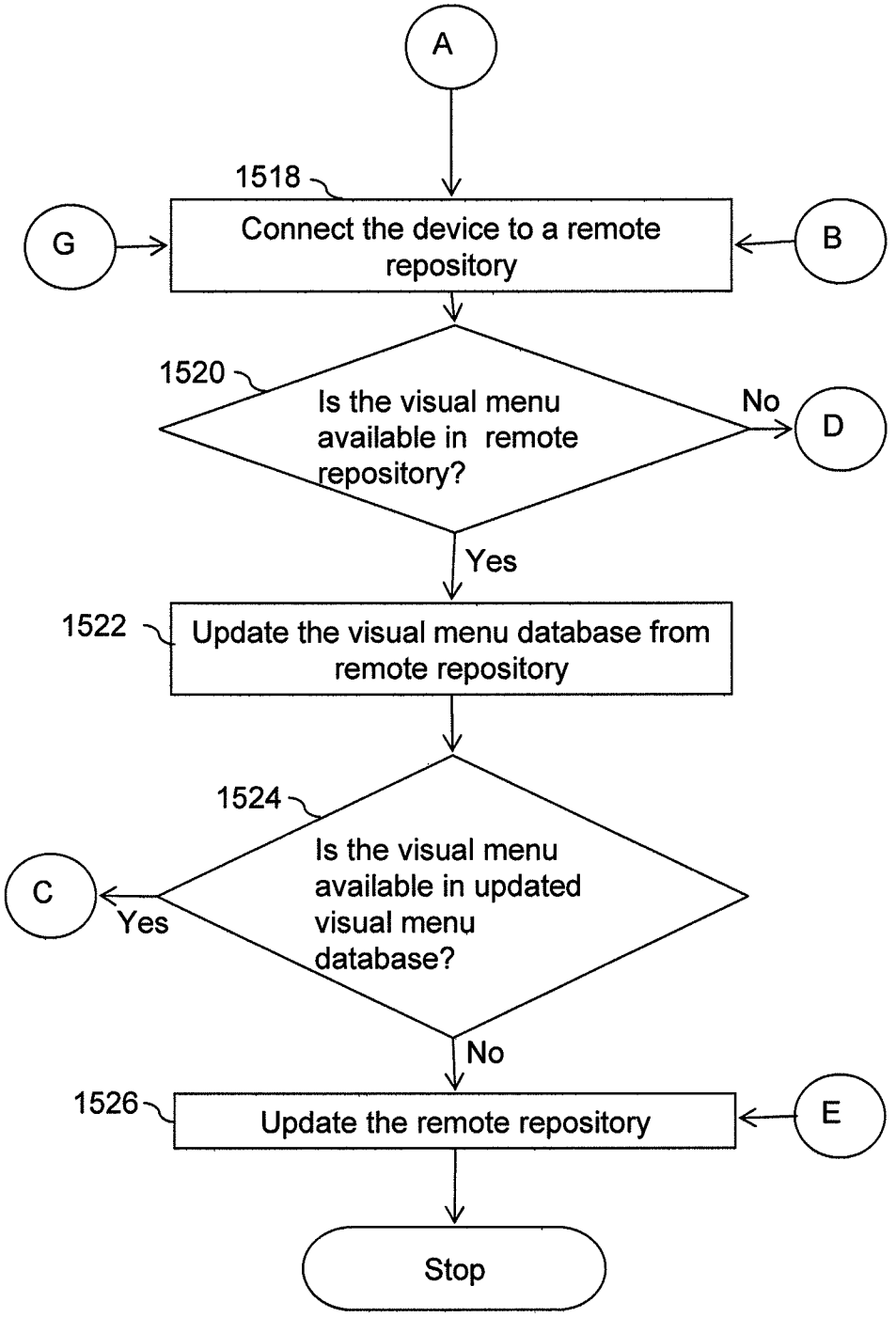

A
1518
G
Connect the device to a remote repository
B
1520
Is the visual menu available in remote repository?
No
D
Yes
1522
Update the visual menu database from remote repository
1524
Is the visual menu available in updated visual menu database?
C
Yes
No
1526
Update the remote repository
E
Stop

FIG. 15B

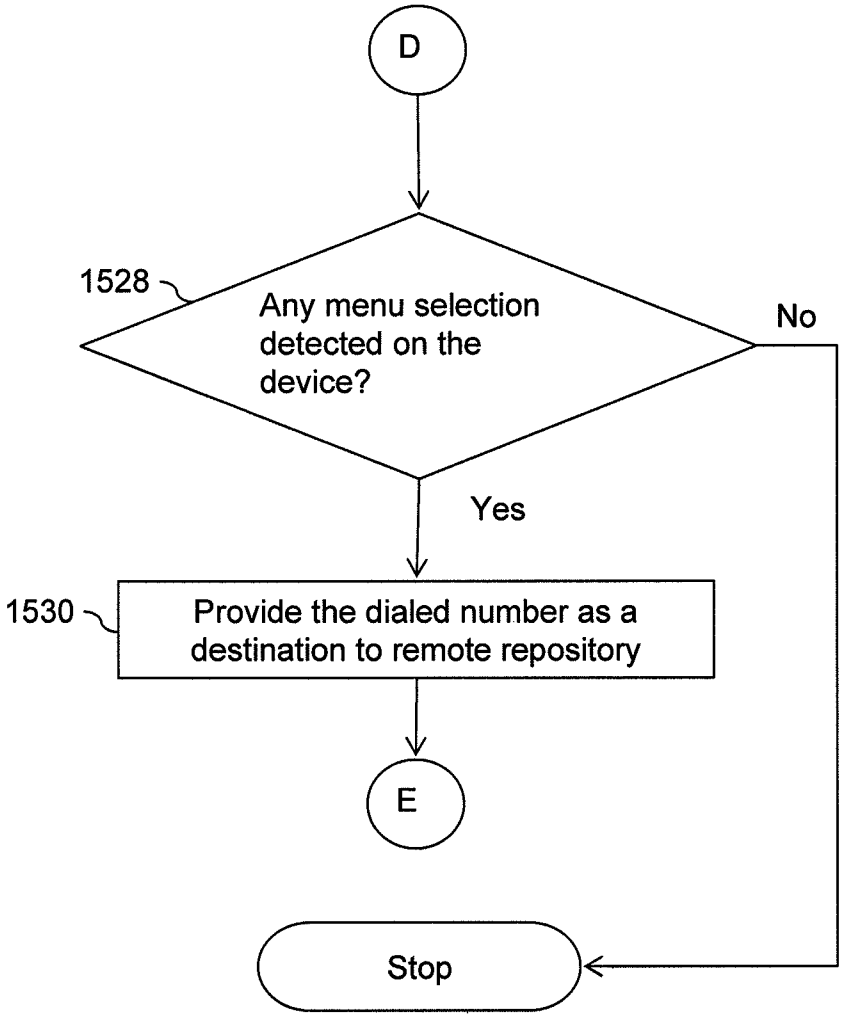

D
1528
Any menu selection detected on the device?
No
Yes
1530
Provide the dialed number as a destination to remote repository
E
Stop

FIG. 15C

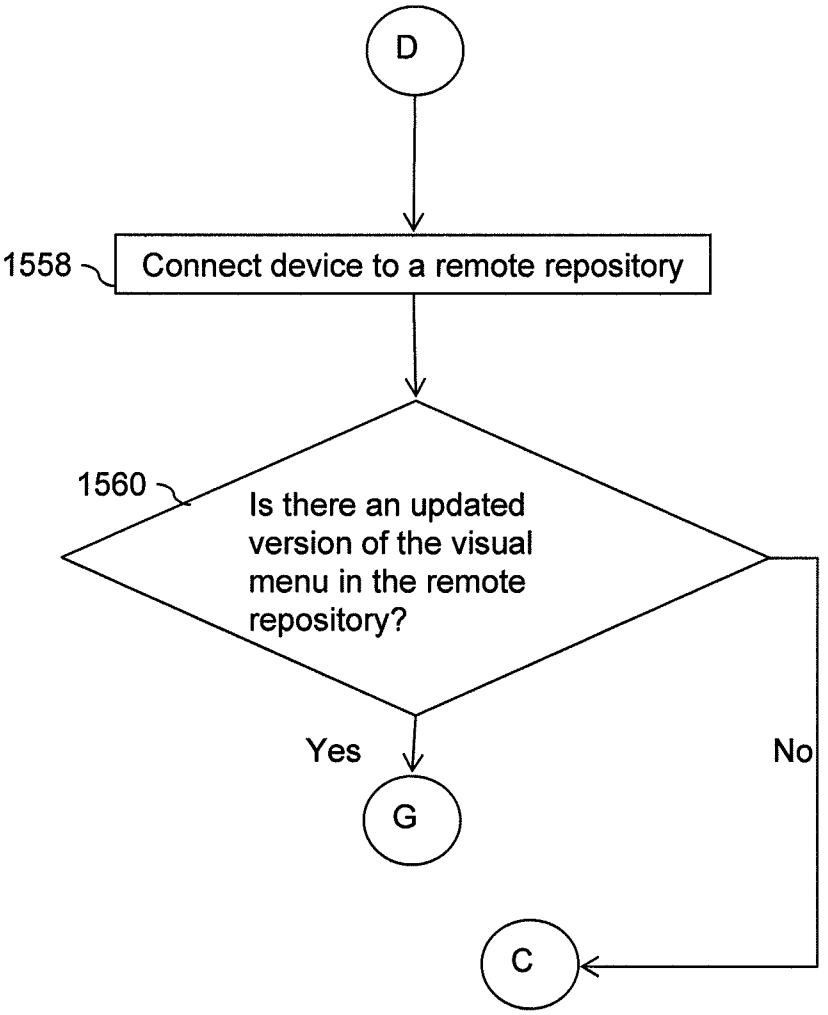

D
1558
Connect device to a remote repository
1560
Is there an updated version of the visual menu in the remote repository?
Yes
No
G
C

FIG. 15D

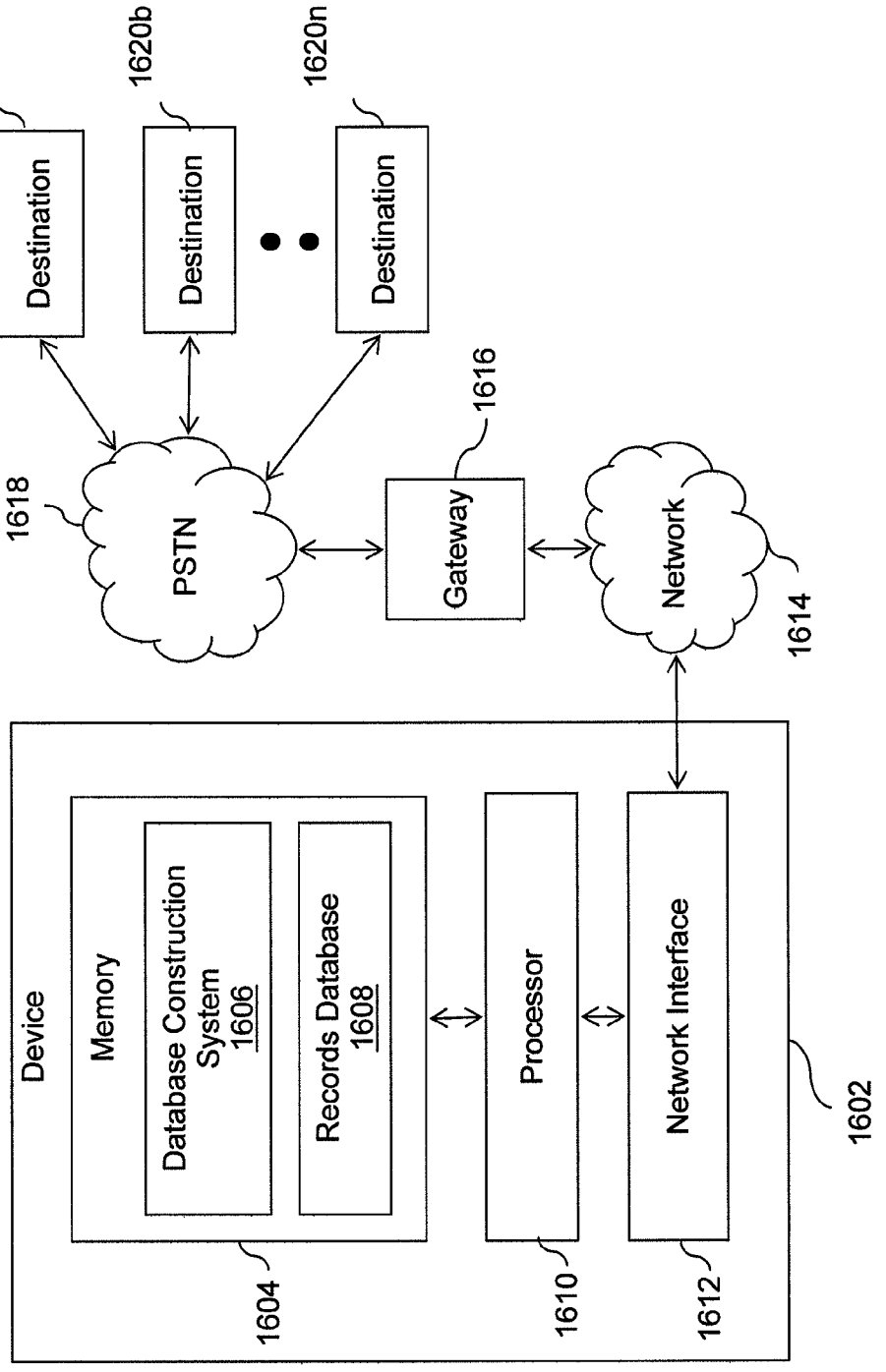

1620a
1620b
1620n
Destination
Destination
Destination
1618
PSTN
1616
Gateway
Network
1614
Device
Memory
Database Construction System 1606
Records Database 1608
Processor
Network Interface
1602
1604
1610
1612

FIG. 16

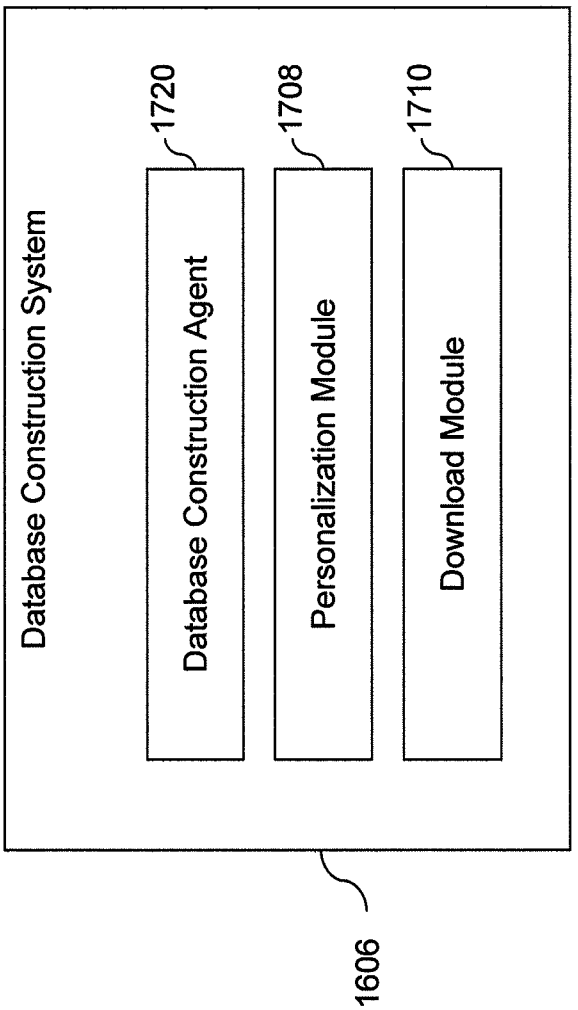

Database Construction System
1720
Database Construction Agent
1708
Personalization Module
1710
Download Module
1606

FIG. 17A

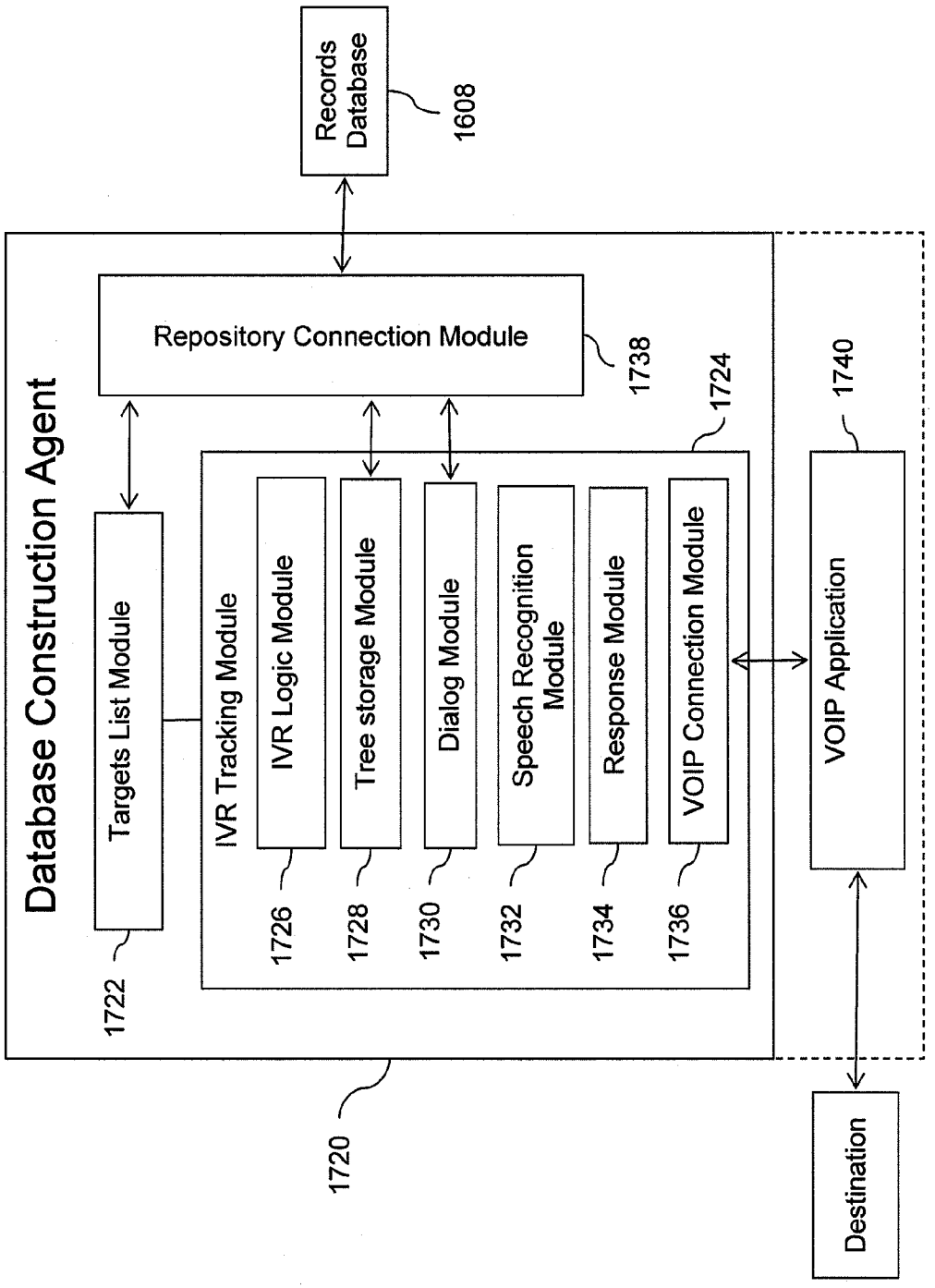

Records Database
1608
Repository Connection Module
1738
1724
1740
Database Construction Agent
Targets List Module
IVR Tracking Module
IVR Logic Module
Tree storage Module
Dialog Module
Speech Recognition Module
Response Module
VOIP Connection Module
VOIP Application
1722
1726
1728
1730
1732
1734
1736
1720
Destination

FIG. 17B

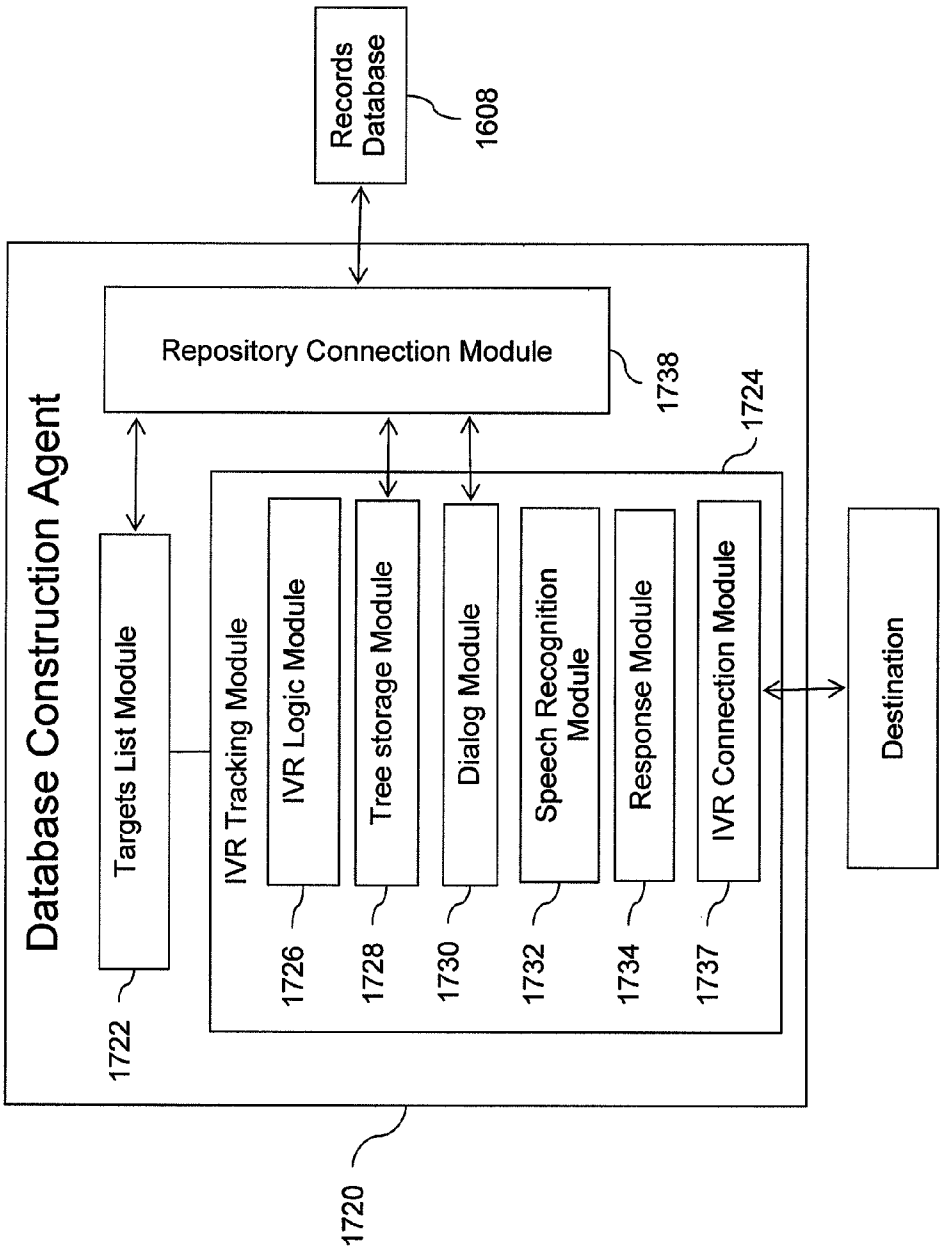

Records Database
1608
Database Construction Agent
Repository Connection Module
1738
1724
Targets List Module
1722
IVR Tracking Module
IVR Logic Module
1726
Tree storage Module
1728
Dialog Module
1730
Speech Recognition Module
1732
Response Module
1734
IVR Connection Module
1737
Destination
1720

FIG. 17C

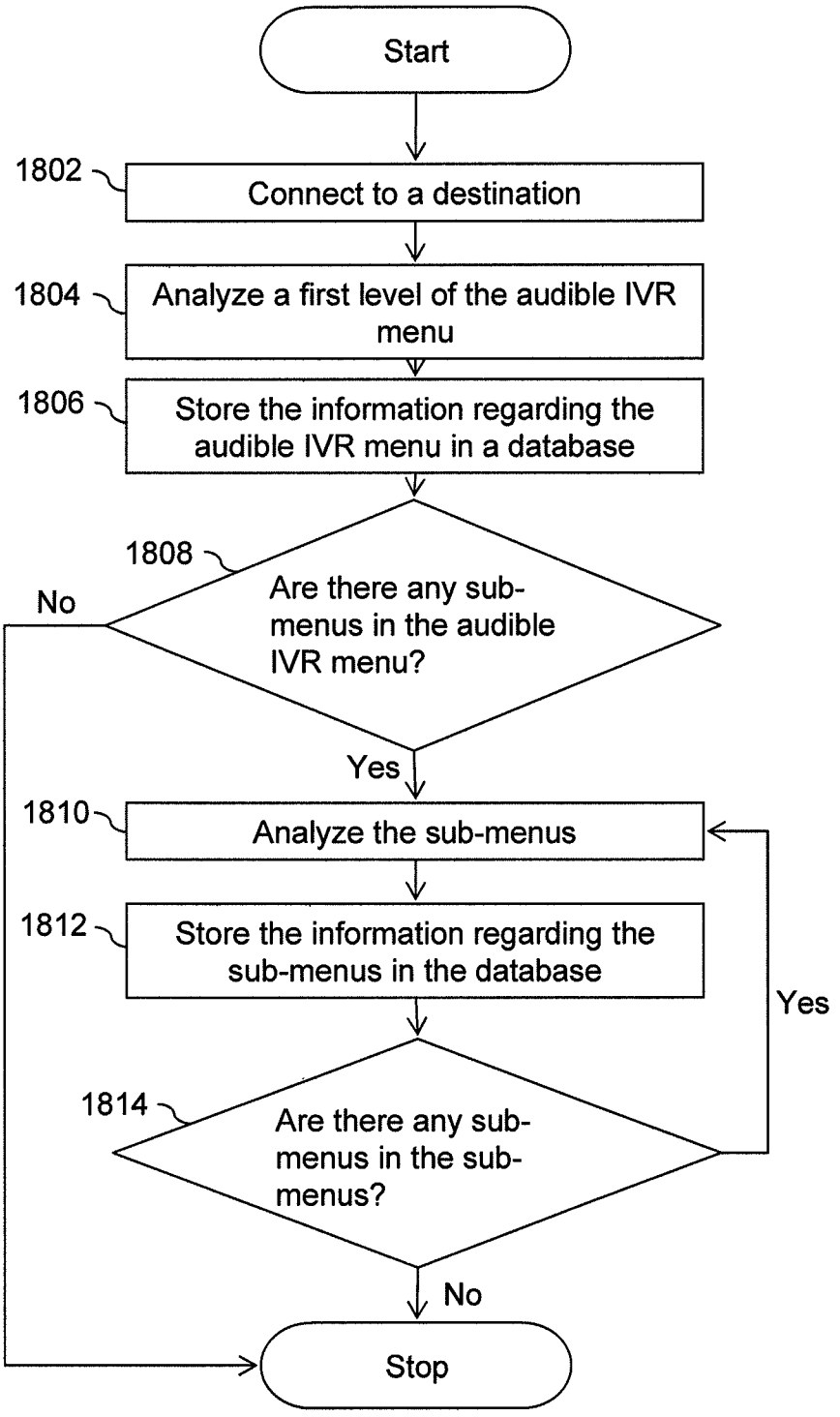

Start
1802
Connect to a destination
1804
Analyze a first level of the audible IVR menu
1806
Store the information regarding the audible IVR menu in a database
1808
Are there any sub-menus in the audible IVR menu?
No
Yes
1810
Analyze the sub-menus
1812
Store the information regarding the sub-menus in the database
1814
Are there any sub-menus in the sub-menus?
Yes
No
Stop

FIG. 18

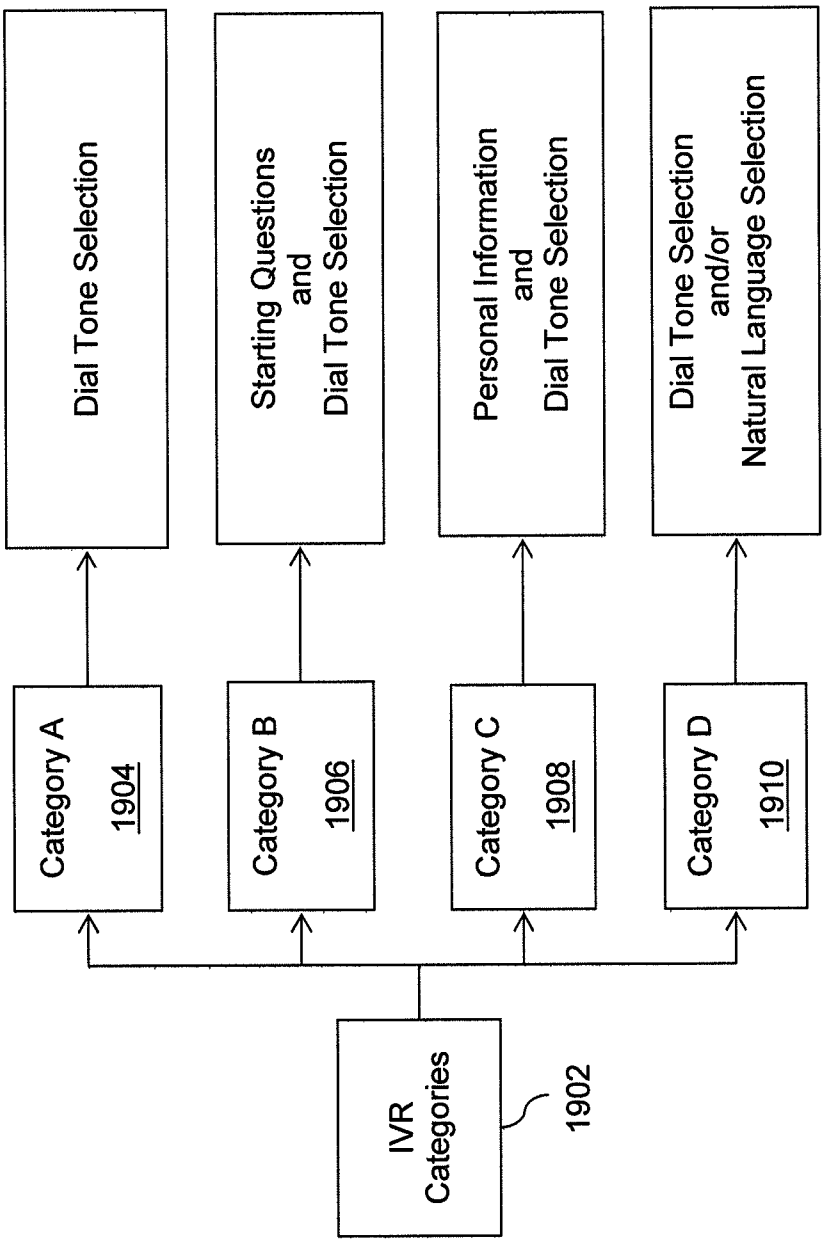

IVR Categories
1902
Category A
1904
Category B
1906
Category C
1908
Category D
1910
Dial Tone Selection
Starting Questions and Dial Tone Selection
Personal Information and Dial Tone Selection
Dial Tone Selection and/or Natural Language Selection

FIG. 19

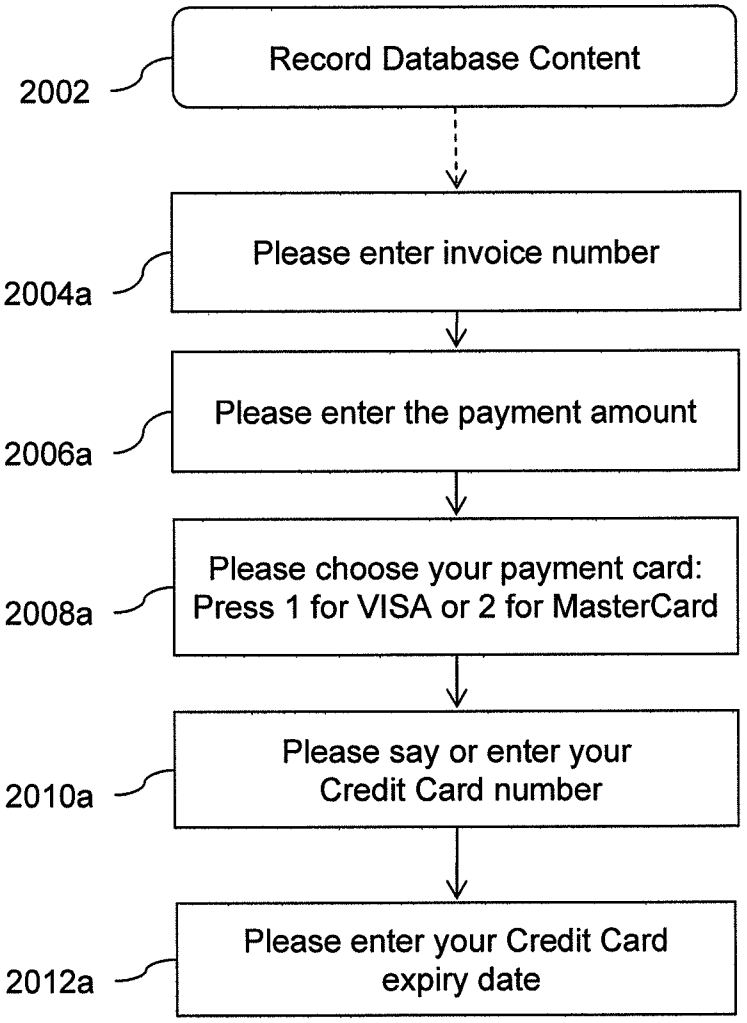

2002
Record Database Content
2004a
Please enter invoice number
2006a
Please enter the payment amount
2008a
Please choose your payment card:
Press 1 for VISA or 2 for MasterCard
2010a
Please say or enter your
Credit Card number
2012a
Please enter your Credit Card
expiry date

FIG. 20A

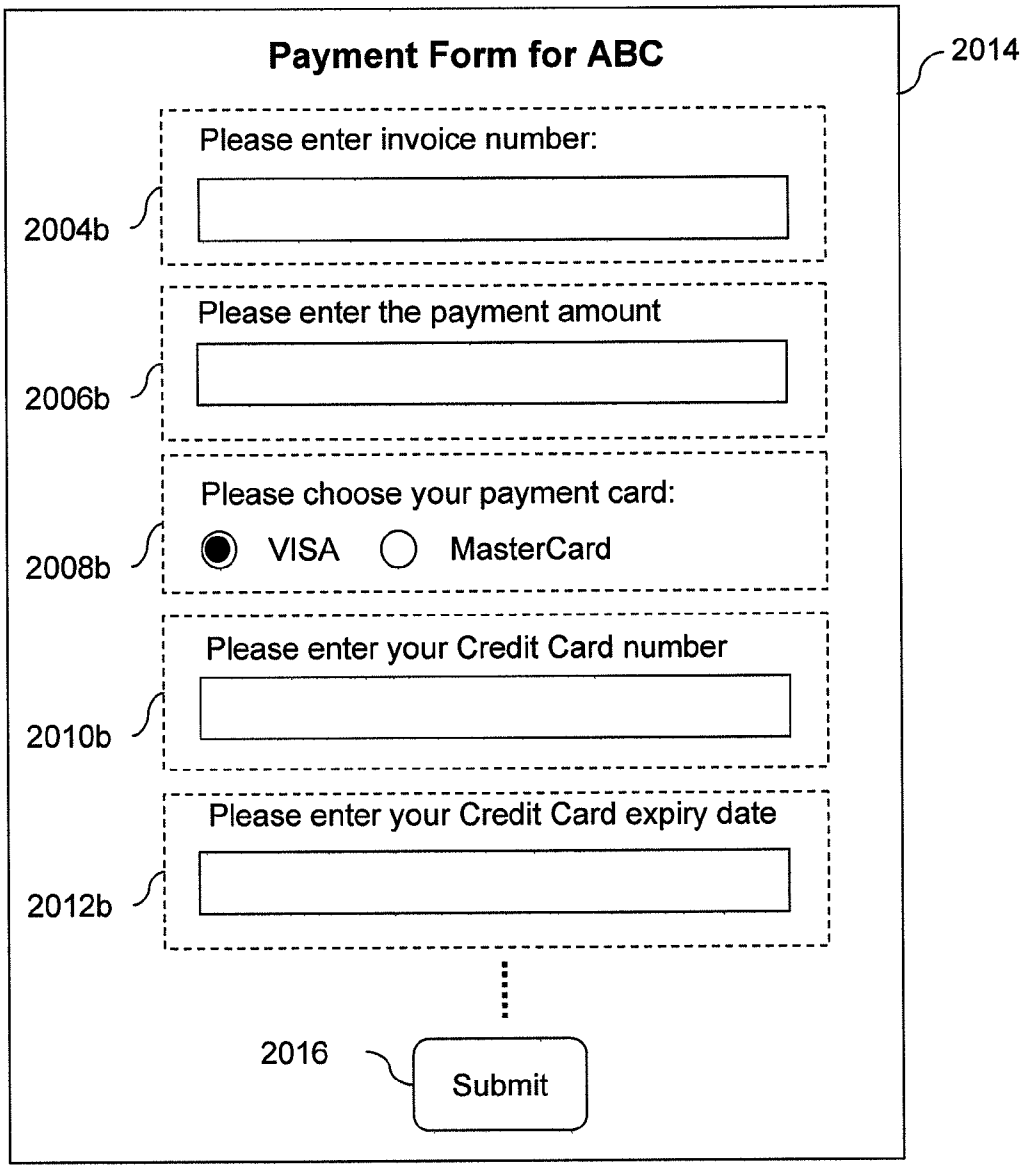

Payment Form for ABC
2014
Please enter invoice number:
2004b
Please enter the payment amount
2006b
Please choose your payment card:
2008b
VISA
MasterCard
Please enter your Credit Card number
2010b
Please enter your Credit Card expiry date
2012b
2016
Submit

FIG. 20B

SYSTEMS AND METHODS FOR VISUAL PRESENTATION AND SELECTION OF IVR MENU

FIELD OF THE INVENTION

The invention relates to Interactive Voice Response (IVR) system and more specifically the invention relates to visual selection of IVR option from a caller device.

BACKGROUND OF THE INVENTION

Interactive Voice Response (IVR) technology is generally used to detect voice and key inputs from a caller. Various organizations such as banks, insurance companies, and other service providers use IVR technology to manage calls from their customers. Typically, IVR systems are used by organizations that have high call volumes. An objective for implementing the IVR systems is to provide the customers with a quick and good experience. Moreover, the cost of providing the services is reduced.

Generally, when the caller calls a destination, such as a bank, an automated audio menu is played. The audio IVR menu can contain instructions to provide instant services such as account balance inquiry when the destination is a bank. Further, audio menu can provide options for the caller to connect to a desired end inside the destination. For example, the menu may direct the caller to press various keys on a telephone to connect to a particular department or agent. The audio IVR menu is designed specific to a destination. Therefore, each destination or organization may have different IVR menus. Further, the IVR menu in an organization can be based on the type of departments, type of services, customer care executives or agents and so forth. For example, an IVR menu of a bank may include options related to the account details of the caller, while an IVR menu of a pizzeria may contain options to order or select a pizza.

Typically, the caller calling the destination may have to listen and follow instructions on the menu to get a desired response or a function performed. Therefore, the process can be time consuming. Moreover, in case the caller provides an incorrect input, the complete process may have to be repeated. Furthermore, the IVR menu for an organization may be updated or changed regularly. For example, extension numbers inside an organization may be changed and correspondingly, the extension numbers associated with the IVR menu may be updated. As a result, a frequent caller may not be able to reach a desired end by remembering a combination of numbers. Therefore, the caller may become frustrated with the IVR systems.

Some prior art try to address this problem by providing visual form of IVR. These prior arts display the IVR menu graphically on a caller device. U.S. Pat. No. 7,215,743 assigned to International Business Machines Corporation and a published U.S. patent application Ser. No. 11/957,605, filed Dec. 17, 2007 and assigned to Motorola Inc., provides the IVR menu of the destination in a visual form to the caller. The caller can select the options from the IVR menu without listening to the complete audio IVR menu. However, the IVR menu displayed on the caller device is stored on an IVR server at the destination end. As a result, the visual IVR menu is specific to the destination and only the IVR of the destination dialed is displayed. Further, the IVR menu may be required to be configured on the server of the destination to display it to the caller, as disclosed in U.S. Pat. No. 7,092,738 assigned to International Business Machines Corporation. A U.S. patent application Ser. No. 11/467,548, filed Aug. 26, 2006 discloses

sending digital signals from the destination to the caller device. Thereafter, the digital signals are processed by the caller device for presenting a visual display of the IVR menu. These techniques therefore, require each destination to set-up hardware, software and other facilities to be deployed for providing visual IVR servers.

Another existing technique as disclosed in U.S. Pat. No. 6,560,320 assigned to International Business Machines Corporation enables an operator of the IVR to send customized signals to the caller for generating and displaying graphical elements on the device of the caller. Thereafter, the caller can respond by selecting options through touch-screen interface of the device. Dual Tone Multi frequency (DTMF) signals of the IVR. However, this technique requires a specifically configured device to interpret the codes sent as Dual Tone Multi frequency (DTMF) signals for generating the graphics. Moreover, an operator is required to present the graphics to the caller. Furthermore, specialized software and hardware are required at the operator to design and generate DTMF codes. Therefore, the technique faces various practical limitations. Further, a U.S. Pat. No. 7,027,990 assigned to Lester Sussman, discloses visual menus for a touch-tone telephone with an embedded computer. In this case the text menus may be pre-loaded into the telephone of the caller as text menus. Therefore, when the caller dials the destination, an associated text menu is displayed on a screen. However, this technique is limited to touch-tone telephones with embedded computer. Another existing technique as disclosed in U.S. patent application Ser. No. 11/957,605, filed on Dec. 17, 2007 and assigned to Motorola Inc., provides a directory of an IVR system in the form of, for example, a menu tree, on screen of the caller device. However, the menu tree is provided to the caller device by a remote server. Another existing technique discloses sending messages such as Short Messaging Service (SMS) to the caller device corresponding to the audible IVR menu. Such technique is disclosed in U.S. patent application Ser. No. 11/877,952, filed Oct. 24, 2007. However, the message functions only as a visual aid and the caller is still required to listen and respond to the audio IVR menu. A published PCT Application WO 2008/086320, filed Jan. 7, 2008 and assigned to Snapin Software Inc., displays IVR menu to the caller's device after connecting a call with the destination.

Generally, the IVR menus of the organizations are in form of audible menu. Moreover, there are a large number of organizations that use IVR menus. Therefore, converting the audible menus to visual menus can be time consuming. An existing technique, as disclosed in U.S. Pat. No. 6,920,425 assigned to Nortel Networks Limited, discloses an automated script to convert the audible menus scripts to visual menu scripts. However, the audible menus scripts must be available in a particular format to enable the conversion. Furthermore, the audio menu scripts must be available or downloadable for the program to function. As a result, only the audio menus scripts that are available can be converted to visual menu scripts. Furthermore, the device of the caller must be designed or programmed to understand the visual menu scripts. A U.S. Pat. No. 6,885,737 assigned to BellSouth Intellectual Property Corp., discloses a web interface for displaying the IVR menu. However, a server is required to transmit the IVR menu to the caller's device.

Various organizations encourage the customers to call them for information on their products or services, or for helping existing customers. Generally, a contact number is provided by the organizations on their website as a button. Therefore, when the customer presses the button a form is displayed. The customer then enters his contact number

where an executive from the organization may call. However, this may be time consuming for the customer. Moreover, the customer may be not being able to talk to another executive during the call in case the on-line executive is not able to satisfy the customer. U.S. patent application Ser. No. 12/049,021, filed Mar. 14, 2008 and assigned to Harprit Singh, provides methods and systems for displaying an IVR menu, when the caller clicks a link on a webpage provided by the organization. However, the customer is still required to request the webpage with embedded information from a server of the organization. Moreover, the methods and systems are limited to the organizations that provide the required webpage to the customers. Other technologies include U.S. patent application Ser. No. 11/877,952 filed Oct. 24, 2007 and assigned to International Business Machine Corporation.

The effectiveness of providing the IVR in visual form is discussed in a technical paper titled, 'The Benefits of Augmenting Telephone Voice Menu Navigation with Visual Browsing and Search' by Min Yin et al. The paper discusses a setup where visual content of the IVR is sent from a service provider to a computer connected to a mobile phone. However, the technique discussed in the paper is limited to the visual content provided by the service provider's end, after the connection is established. Moreover, the providers are required to individually set up the hardware and services for providing visual content.

As discussed above the existing technologies have various limitations.

SUMMARY

An aspect of the invention is to provide to a caller using a device a visual menu corresponding to an audible IVR menu of a destination.

Another aspect of the invention is to enable the caller to directly interact with the visual menu without listening to the audible IVR menu of the destination.

Yet another aspect of the invention is to provide the visual menu to the caller before establishing a connection of the device with the destination.

Another aspect of the invention is to enable the caller to interact with the visual menu by using a touch sensitive screen of the device.

Another aspect of the invention is to provide advertisements related to the destination or function of the destination dialed by the caller.

A caller may dial or select a phone number from a device of a destination. The phone number is detected by Visuphone implemented on the device to display a visual menu corresponding to the audible IVR menu of the destination. Visuphone may be hardware, an application stored as a software or firmware on the device, or a combination thereof. Visuphone may include a database of visual menus corresponding to audible IVR menus for various destinations. Thereafter, the caller may interact with the visual menu displayed on the device to establish a connection with the destination. Furthermore, Visuphone may detect and launch a VOIP application for establishing the connection. Moreover, Visuphone may provide pre-recorded or computer synthesized audio responses on behalf of the caller to the destination.

An enhanced telephone system is provided. The telephone system comprises a database that comprises one or more phone numbers and one or more menus corresponding to the phone numbers, wherein the menus comprise one or more options for selection. The telephone system comprises means for comparing a dialed number to the phone numbers in the database; means for displaying a menu based on a result of the comparison; means for enabling selection of the one or more options from the displayed menu; and means for establishing a connection with a destination of the dialed number based on the selection of the one or more options.

An enhanced telephone system is provided. The telephone system comprises a database comprising one or more phone numbers and one or more menus corresponding to the phone numbers, wherein the menus comprises one or more options for selection; means for comparing the a received number of a received call to the phone numbers in the database; means for displaying a menu based on a result of the comparison; and means for enabling selection of the one or more options from the displayed menu.

A method for providing enhanced telephony is also provided. The method comprising identifying a number dialed from a telephone system; comparing the dialed number to one or more phone numbers stored in a database, wherein the database comprises one or more menus corresponding to the phone numbers, and wherein the menus comprises one or more options for selection; and displaying on the telephone system a menu from the database based on a result of the comparison.

Another aspect of the invention is to generate a database of visual menus. The database generation could be done by successive calling the IVR and combined with voice recognition. Calling the IVR systems can be done manually by operators that will listen to options of the IVR and enter these options into the database. In this manual mode, the operator will dial IVR numbers from a list and for each of them will follow all the options in several levels and in each level, enter the menu entries into the database. This can be done to many different IVR phone numbers, by one or multiple operators. The voice menu can be recorded to for analyzing in a different process or a different time.

Another aspect of the invention is to generate a database of visual menus by a computer system. Combination of hardware and software that is connected to phone system and automatically dials the IVR phone numbers, record the different options of the voice menu, analyze the voice menu and generate and enter the different entries into the database. The system will generate the voice tone that simulates the relevant touchtone of a phone number pressed. This process will be done in several levels until covering all the entries in all the levels of the specific IVR system. This process is done for all the IVR phone number in the list.

Additional alternative is to access the IVR internal database and download the menu. This approach requires the collaboration with the IVR maker and at least permission from the IVR owner. Having both a system could be build to access IVR using their maintenance port, which is often connected to the Internet. Accordingly, the system would access the IVR and once authorized by the IVR owner it will download the internal file representing the IVR menu, which could be called the IVR customization record. The downloaded file would then be converted to visual menu by utility that could be design according to the format, which could be provided by the IVR maker.

Another aspect of the invention is to provide updates to the visual menus stored in the device.

Another aspect of the invention is to provide the visual menu when the call is forwarded from one destination to another.

Another aspect of the invention is to provide visual menus on electronic devices with screens that are connected to Visuphone.

Additional aspect of the invention is an automatic learning of user choice and uses that for assisting the user in his future calls.

BRIEF DESCRIPTION OF THE DRAWINGS

Having thus described the invention in general terms, reference will now be made to the accompanying drawings, which are not necessarily drawn to scale, and wherein:

FIG. **1***a* illustrates an exemplary environment where various embodiments of the invention function;

FIG. **1***b* illustrates another exemplary environment where various embodiments of the invention function;

FIG. **1***c* illustrates yet another exemplary environment where various embodiments of the invention function;

FIG. **2**A illustrates an exemplary audible Interactive Voice Response (IVR) menu at a destination;

FIG. **2**B illustrates an exemplary visual menu at a device corresponding to the audible IVR menu of the destination;

FIG. **2**C illustrate an exemplary visual menu that display graphics for each option;

FIG. **2**D illustrate an exemplary tooltip that is displayed when a curser is hovering on an option in the visual menu;

FIGS. **3**A, **3**B illustrates exemplary components of the device for implementing a Visuphone, in accordance with an embodiment of the invention;

FIG. **4** illustrates an exemplary display of the visual menu on the device, in accordance with an embodiment of the invention;

FIG. **5** illustrates exemplary components of the device for implementing the Visuphone, in accordance with another embodiment of the invention;

FIG. **6** illustrates an exemplary display of the visual menu on the device, in accordance with another embodiment of the invention;

FIG. **7** illustrates a webpage displayed on the device that may be used to initiate a connection to the destination, in accordance with an embodiment of the invention;

FIG. **8** illustrates an exemplary software architecture of Visuphone, in accordance with an embodiment of the invention;

FIG. **9** illustrates exemplary components of the Visuphone, in accordance with an embodiment of the invention;

FIG. **10** illustrates an exemplary remote server for storing information required by the Visuphone, in accordance with an embodiment of the invention;

FIG. **11** illustrates presentation of a visual menu in case of call forwarding, in accordance with an embodiment of the invention;

FIG. **12** illustrates the presentation of the visual menu when a phone connection is associated with a wide band internet 'smart' modem;

FIG. **13** illustrates the presentation of the visual menu when a telephone connection is established through an external telephone service by using a computer;

FIGS. **14**A, **14**B, and **14**C illustrate a Visu-add-on that provides the features and functionality of the Visuphone;

FIGS. **15**A, **15**B, **15**C, and **15**D illustrate a flowchart diagram for presentation, selection and update of visual menus, in accordance with an embodiment of the invention;

FIG. **16** illustrates exemplary components of a device for implementing a database construction system, in accordance with an embodiment of the invention;

FIGS. **17**A, **17**B, and **17**C illustrate exemplary components of the database construction system, in accordance with an embodiment of the invention;

FIG. **18** illustrates a flowchart diagram for creating a database for visual menus, in accordance with an embodiment of the invention;

FIG. **19** illustrates an exemplary set of IVR categories;

FIG. **20**A illustrates an exemplary information process stored in a database;

FIG. **20**B illustrates an exemplary web form generated for the information process of FIG. **20**A.

DETAILED DESCRIPTION OF THE INVENTION

Illustrative embodiments of the invention now will be described more fully hereinafter with reference to the accompanying drawings, in which some, but not all embodiments of the invention are shown. Indeed, the invention may be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will satisfy applicable legal requirements. Like numbers refer to like elements throughout.

FIG. **1***a* illustrates an exemplary environment where various embodiments of the invention function. A caller **106** may use a device **102***a* to connect to destinations **108***a-n*. Device **102***a* can be a telecommunication device that can connect directly to a Public Switched Telephone Network (PSTN) **110**. A person skilled in the art will appreciate, that device **102***a* can also connect to a private telephone exchange. Examples of device **102***a* include, but not limited to, a telephone, a mobile phone, a Smartphone or any other device capable of voice or data communication. When caller **106** dials a phone number and connects to any destination from destinations **108***a-n*, an audible Interactive Voice Response (IVR) menu may be played to caller **106**. Each of destinations **108***a-n* can have different IVR menus. For example, IVR menus of bank may be completely different from that of a hospital. Typically, the audible IVR menu provided by destinations **108***a-n* comprises audible options or instructions. Caller **106** may be required to select various options from the audible IVR menu to obtain the required information or service from the dialed destination. Various types of destinations **108***a-n* that implement the audible IVR menu include, for example, banks, hotels, fast-food outlets, utility services providers, corporate offices and so forth. Device **102***a* includes a Visuphone **104** that displays a visual menu on device **102***a* corresponding to the audible IVR menu based on a phone number of the destination to be connected. Visuphone **104** may be hardware, an application stored as software, a firmware on device **102***a*, or a combination thereof. Thereafter, caller **106** can select the options of the audible IVR menu from the visual display without the requirement to listen to the audible instructions. Exemplary audible IVR menu at destination **108***a* and a corresponding visual menu are explained in detail in conjunction with FIGS. **2**A and **2**B.

FIG. **1***b* illustrates another exemplary environment where various embodiments of the invention function. As shown, device **102***b* can be a device that can be connected directly to a network **112**. Examples of device **102***b* include, but are not limited to, a personal computer, a laptop, a mobile phone, a smart-phone, a fixed line telephone, Voice Over Internet Protocol (VOIP) phone or other devices capable of voice or data communication. Device **102***b* may include various applications or computer programs that enable caller **106** to use device **102***b* for connecting to destinations **108***a-n* through PSTN **110** over network **112**. For example, the applications may be VOIP applications, such as but not limited to, Skype, Magic Jack, Google Talk and so forth. A gateway **116** provides interconnection between PSTN **110** and network **112**.

Examples of network **112** include any wired or wireless network, such as but not limited to, a Local Area Network (LAN), a Wide Area Network (WAN), a Wi-fi network and so forth. As discussed with reference to FIG. **1***a*, destinations **108***a-n* presents the audible IVR to caller **106**. Device **102***b* includes Visuphone **104***b* that displays a visual menu on device **102***b* corresponding to the audible IVR menu based on a phone number of the destination to be connected.

FIG. **1***c* illustrates yet another exemplary environment where various embodiments of the invention function. As shown, device **102***b* can be connected to PSTN **110** through network **112** or through the cellular network **111**. Various service providers provide multiple or overlapping services to customers. For example, cable television service provider may also provide phone and Internet service, optical Internet provider may also provide phone or television services, WiMax service providers that provide phone service and so forth. Network **112** may be any service provider that provides such services, for example, but not limited to, cell phone services, wireless services, Internet services, cable television services, or various combinations of the above or other type of services. As discussed with reference to FIG. **1***a*, destinations **108***a-n* presents the audible IVR to caller **106**. Device **102***b* includes Visuphone **104** that displays a visual menu on device **102***b* corresponding to the audible IVR menu based on a phone number of the destination to be connected.

With reference to FIG. **2**A, an audible IVR menu **222***a* at destination **108***a* is illustrated. A person skilled in the art will appreciate that audible IVR menu **222***a* is an exemplary graphical representation of the audible instructions presented by destination **108***a* for the sake of explanation and is not an actual graphical display. For explanation, assuming that destination **108***a* is a pizzeria that provides home delivery and takes away services. Caller **106** connects to destination **108***a* by dialing a board phone number **202***a*. Subsequently, various options of audible IVR menu **222***a* are played to caller **106**. The various options include an option **204***a* that plays an audible instruction, "press 2 for pizza order", an option **206***a* that plays an audible instruction, "press 3 for order status", an option **220***a* that plays an audible instruction, "press 0 for main menu". Caller **106** can select an option by pressing from device **102**, a button corresponding to the instructions in the audible IVR menu. Subsequently, the selected options are transmitted to the destination and the menu is advanced if there are any further options. Alternatively the display can present the next layer of menu options to give the user better view of the option domain and allow even faster interface between user and the IVR.

For example, selection of option **204***a* presents an option **208***a* that plays an audible instruction, "press 1 for veg" and an option **210***a* that plays an audible instruction, "press 2 for non-veg" is played. Similarly, selecting option **208***a* or **210***a* presents or option **214***a* that plays an audible instruction, "press 1 for home delivery", an option **216***a* that plays an audible instruction, "press 2 for take away". Similarly, selection of option **206***a* presents an option **212***a* that plays an audible instruction, "press 1 to talk to an executive".

Options **204***a*, **206***a*, **208***a*, **210***a*, **212***a*, **214***a*, and **216***a* are part of a main menu **218***a*. Main menu **218***a* can be repeated by selecting option **220***a* by caller **106**. Caller **106** may repeat main menu **218***a* for example, in case of a mistake in selection. Therefore, caller **106** directly interacting with audible IVR menu **222***a* may be required to listen to all or various audible options before executing a desired action. However, the interaction is simplified by Visuphone **104**, that presents a visual menu **222***b* to caller **106** corresponding to audible IVR menu **222***a*, as explained with reference to FIG. **2**B.

As shown in FIG. **2**B, visual menu **222***b* is displayed on a screen of device **102***b* that may connects to destination **108***a* through network **112** and the PSTN **110**. Visual menu **222***b* can be displayed before a connection is established with destination **108***a*. A person skilled in the art will appreciate that device **102***b* is illustrated for the sake of explanation, and similar visual menu **222***b* can be displayed on device **102***a* that connects to destination **108***a* directly through PSTN **110**. Visual menu **222***b* includes various nodes corresponding to the options of an audible IVR menu of destination **108***a*. The various nodes of visual menu **222***b* include a node **202***b* for connecting to board number **202***a* of destination **108***a*. Similarly, nodes **204***b*, **206***b*, **208***b*, **210***b*, **212***b*, **216***b* corresponds to option **204***a*, **206***a*, **208***a*, **210***a*, **212***a*, **216***a* respectively. A node corresponding to option **220***a* may not be required in visual menu **222***b*, as the complete menu is visible and caller **106** may not be required to repeat audible IVR menu **222***a*. Therefore, when caller **106** selects a node from visual menu **222***b*, Visuphone **104** automatically transmits the desired action corresponding to the options in audible IVR menu **222***a* to destination **108***a*. For example, assuming that caller **106** calls destination **108***a* to order a veg pizza for home delivery. In this case, caller **106** directly selects nodes **208***b* and **214***b* from a touch screen of device **102***a*, corresponding to veg pizza and home delivery from visual menu **222***b*. Alternatively, caller **106** directly selects nodes **204***b*, **208***b* and **214***b* by pressing corresponding keys '2', '1', and '1', from a keypad or screen of device **102***a* without a need to listen to the complete audible IVR menu. Visuphone **104** accordingly transmits the signals to audible IVR menu **222***a*. In this case, the signals required by audible IVR menu **222***a* may be the Dual Tone Multi-Frequency (DTMF) tones of '2', '2', and '1' for options **204***a*, **208***a*, and **214***a*. Moreover, caller **106** may not be required to select all the options. For example, when caller **106** wants to order a veg-pizza for take away. Then, only the nodes **208***b* and **216***b* may be required to be selected, and node **204***b* is automatically understood by Visuphone **104***b*. Furthermore, a node that is necessary for a transaction is automatically highlighted. For example, if caller **106** only selects node **216***b* for take away, then node **208***b* for a veg-pizza or node **210***b* for non-veg are highlighted for selection. In an embodiment of the invention, caller **106** may select nodes irrespective of the sequence presented in the audible IVR menu. For example, node **214***b* for home delivery may be selected before node **208***b* of veg-pizza. Visuphone **104** automatically generates a sequence of the selections made by caller **106** and transmits it to the destination. Furthermore, Visuphone **104** stores the selections and the numbers dialed by the caller during the call in association with the destination number. The Visuphone may enable callers to search or bookmark options in a menu with a large number of options. For example, callers can search for a node **214***b* from the menu by typing 'home delivery'. As a result, navigation of a complete visual menu may not be required.

In an embodiment of the invention, visual menu **222***b* is displayed to caller **106** when a call is received at device **102**. For example, a service provider may call to provide information about new services or account of caller **106**. Further, caller **106** may be required to select various options based on his preferences. Visuphone **104***b* may detect the received number and correspondingly display a visual menu to the caller.

FIG. **2**C illustrates a visual menu **222***c* with added graphics for the nodes. It is well known that graphics are easier to learn and are faster to recognize than words. Therefore, graphics are used in various computerized device interfaces. The exemplary graphics as shown with reference to FIG. **2**C are

icons. Various other types of graphics can be displayed for example, animated icons, icons that highlight or animate when the node is highlighted, and so forth.

The graphics may be displayed for each node or a few nodes based on the usability of visual menu **222***c*. For example, for the node **208** can icon of a vegetable may be displayed to designate a vegetarian pizza, and for the node **214***c* of home delivery, an icon of house may be displayed. In an embodiment of the invention, visual menu **222***c* can be customized to display only the text, only the icons or both. Furthermore, caller **106** can suggest or use various icons based on his preferences.

FIG. **2**D illustrate an exemplary tooltip that is displayed when a curser is hovered over an option in the visual menu. As shown, a tooltip box **222** is displayed when a cursor **226** is hovered on option **204***c* or **206***c*. Similarly, a tooltip box **224** may be displayed containing the next menu text with or without it's available options **210***c*, **208***c* in case the user decides to select the option over which cursor **226** is hovered, for example option **204***c*.

In an embodiment of the invention, Visuphone **104***b* may provide a standard menu per group of similar audible IVR or destinations. With reference to FIG. **2**B an example of a menu at a pizza provider is discussed. Generally, every pizza provider may have its specific audible IVR menu. However, caller **106** may prefer to use a single standard visual menu for all pizza providers. Therefore, learning a single visual menu will be useful for engaging various providers. In such a case, the database may include a standard menu per class of compatible providers. Visuphone **104***b* may offer caller **106** an option to use the standard domain menu. Therefore, when caller **106** makes a selection on the standard menu, Visuphone **104** may translate the selection to the specific audible IVR menu selection and send the proper dialing tones to that specific audible IVR. Furthermore, the standard menus may be published. Therefore, various providers may modify their own menus to help their customers. Additional aspect of the standard menu is the use of icons as discussed with reference to FIG. **2**C. The icons may represent standard choice across various domains. For example, if a specific icon may represent sales, then the same icon may be used for sales of airlines tickets when the destination is an airline company or sales of telephone service when the destination is a telephone company. In an embodiment of the invention, the caller may customize the icons or graphics displayed on the menu.

FIG. **3** illustrates exemplary components of device **102***a* for implementing Visuphone. Device **102***a* includes a system bus **324** to connect the various components. Examples of system bus **324** include several types of bus structures including a memory bus or memory controller, a peripheral bus, or a local bus using any of a variety of bus architectures. As discussed with reference to FIG. **1***a*, device **102***a* can be a device such as computer, a smart-phone and so forth. Device **102***a* can connect to PSTN **110** through a gateway **324**, which is connected to network **112** through a network interface **314**. Input/Output (IO) interface **316** of device **102***a* may be configured to connect external or peripheral devices such as a memory card **318**, a keyboard and a mouse **320** and a Universal Serial Bus (USB) device **322**. Although not shown, various other devices can be connected through IO interface **316** to device **102***a*. In an embodiment of the invention, device **102***a* may be connected to a hub that provides various services such as voice communication, Internet access, television services and so forth. For example, the hub may be a Home Gateway device that acts as a hub between the home environment and the Broadband Network.

Device **102***a* includes a display **302** to output graphical information to caller **106**. In an embodiment of the invention, display **302** may includes a touch sensitive screen. Therefore, caller **106** can provide inputs to device **102***a* by touching display **302** or by point and click using the 'mouse'. Memory **306** of device **102***a* stores various programs, data and/or instructions that can be executed by Central Processing Unit (CPU) **304**. Examples of memory include, but are not limited to, a Random Access Memory (RAM), a Read Only Memory (ROM), a hard disk, and so forth. A person skilled in the art will appreciate that other types of computer-readable media which can store data that is accessible by a computer, such as magnetic cassettes, flash memory cards, digital video disks, and the like, may also be used by device **102***a*. Memory **306** may include Operating System (OS) (not shown) for device **102***a* to function. Further, memory **306** may include other applications **310** that enable the caller to communication with destinations. Examples of other applications **310** include, but are not limited to, Skype, Google Talk, Magic Jack, and so forth. Other applications **310** may be stored as software or firmware on device **102***a*. Further, memory **306** includes Visuphone **104** for presenting a visual menu corresponding to the audible IVR menu of destination as discussed with reference to FIGS. **2**A, **2**B and **2**C. Visuphone may be an application stored as a software or firmware on device **102***a*. The visual menus are stored in a visual menu database **308** in memory **306** of device **102***a*. Visuphone **104** searches visual menu database **308** for visual menus corresponding a phone number of destinations **108***a-n* dialed by caller **106**. Further, Visuphone **104** searches visual menu database **308** for visual menus corresponding a phone number of a call received from a destination to caller **106**. Subsequently, if the visual menu for the phone number is available in the database, then the visual menu is displayed on display **302**. Further, Visuphone **104** may be implemented as a plug-in to other applications **310**. Therefore, when a phone number is dialed from other applications **310**, Visuphone **104** detects the dialing of the number and automatically displays the visual menu corresponding to the phone number. Thereafter, the caller can interact with the visual menu, without listening to the complete audible IVR menu of destinations.

With reference to FIG. **4**, an exemplary display of a visual menu **406** on device **102***c* is illustrated. The caller may dial a phone number **402** corresponding to a destination using keypad **320**. Keypad **320** may be a physical keypad or a virtual keypad displayed on a touch screen display **412**. Subsequently, visual menu **406** corresponding to phone number **402** is searched and displayed on display **412**.

In an exemplary instance, if caller dials a phone number of an IVR destination, then a visual menu corresponding to audible IVR menu of the destination is displayed on display **412**. Similarly, if the caller receives a call from a phone number of destination, then a visual menu corresponding to audible IVR menu of destination is displayed on display **412**. Thereafter, caller can interact with the visual menu to select options from the audible IVR menu. Visual menu **406** may be displayed before actual connection of device **102***c* to destinations. Therefore, caller can select a desired action from visual menu **406** before connecting to destinations. In an embodiment of the invention, visual menu **406** may be provided in real-time to caller. In an embodiment of the invention, visual menu **406** is provided a messaging service such as a Short Messaging Service (SMS). Therefore, destinations may provide customized visual menu **406** to caller **106**. Visual menu **406** may be customized based on the profile of caller. In an embodiment of the invention, the profile may be

generated based on access pattern of caller or the data capture by a hub connected to device **102***c*.

Caller can interact with visual menu **406** by pressing a desired button from keypad **320**. For example, caller can press a '5' key from keypad **320** to select a node **5** in visual menu **406**. Further, caller can directly select the node **5** of visual menu **406** from display **412**, in case of a touch sensitive screen. Depending on the complexity or size of destinations, visual menu **406** may have various nodes. Moreover, display area of display **412** may be limited or small. As a result, all the nodes of visual menu **406** may not be displayed together on display **412**. In such a case, Visuphone is configured to allow caller to navigate by scrolling horizontally and/or vertically to view nodes on visual menu **406**. Further, Visuphone may detect the capability of device **102***a* before displaying the visual menu. For example, in case device **102***a* is a basic mobile phone with limited functionality of the display screen. Therefore, Visuphone may display the visual menu in form of a simple list. Similarly, a list may be displayed in case of fixed line telephones. Moreover, in case device **102***c* includes a high capability screen, such as but not limited to an iPhone, then the visual menu is displayed in form of graphics.

Subsequently, after caller selects a desired action from visual menu **406**, a connection is established between device **102***c* and destinations based on the selected option. In one embodiment, Visuphone is configured to detect and present an application or computer program available on device **102***c*.

Visuphone can be further configured to display an advertisement **408**. Advertisement **408** may correspond to the type of services provided by the dialed destinations. For example, if destination dialed is a pizzeria, then advertisement **408** may include promotions or offers about a new pizza. Moreover, advertisement **408** may include promotions or offers from a third party or a competitor of the destination. Further, Visuphone may be coupled to an advertising database. The advertising database may include advertisements related to the phone numbers of the destinations. The advertising database may be stored at device **102***c*, the destinations, service providers or other third party servers. Further, the advertisements may be provided based on a profile of caller. For example, assuming that the caller calls a bank holding his saving account. Therefore, the advertisement displayed to the caller may be based on the location, address, account balance, type and volume of transactions, loans, purchases and so forth.

Visuphone may be configured to connect to an intended destination, when caller selects advertisement **408**. Further, Visuphone displays visual menu **406** of the intended destination. In an embodiment, Visuphone stores the interactions of caller with visual menus. For example, Visuphone may automatically learn the numbers dialed or options selected from the menu. Moreover, the learned numbers or choices are associated with the dialed phone number of the destination. Therefore, the caller is assisted in his future calls. For example, when caller calls the destination again, then the actions that were performed in the last interaction are presented prominently to caller; or a previous sequence may be automatically performed. Further, the actions that are frequently performed are presented prominently to caller. For example, if caller dials a bank frequently to enquire about his account balance, then the options for selecting his account balance may be highlighted.

FIG. **5** illustrates exemplary components of device **102***b* for implementing Visuphone, in accordance with another embodiment of the invention. Device **102***b* includes a system bus **526** to connect the various components. Examples of system bus **526** include several types of bus structures such as, but not limited to, a memory bus or memory controller, a peripheral bus, or a local bus using any of a variety of bus architectures. As discussed with reference to FIG. **1***b*, device **102***b* can be a computing device such as, but not limited to, a personal computer, a laptop, a mobile phone, a smart-phone, and so forth. Device **102***b* can connect to network **112** through a network interface **514**. Further, device **102***b* can connect to PSTN **110** through gateway **116** and network **112** through network interface **514**. Input/Output (IO) interface **516** of device **102***b* may be configured to connect external or peripheral devices such as a mouse **518**, a keyboard **520**, a speaker **522**, microphone **523** and a camera **524**. Although not shown, various other devices such as hard disk, a Universal Serial Bus (USB) device or others can be connected through IO interface **516** to device **102***b*. A person skilled the art will appreciate that although not described, various other types of devices capable of voice and/or data communication can be connected to device **102***b*.

Device **102***b* includes a display interface **502** to connect to a display **512**. Display interface **502** can be for example, a video adapter. Display **512** outputs graphical information to caller. In an embodiment of the invention, display **512** includes a touch sensitive screen. Therefore, caller **106** can provide inputs to device **102***b* by touching display **512** or by pointing with the mouse and click. Memory **506** of device **102***b* stores various programs, data and/or instructions that can be executed by Central Processing Unit (CPU) **504**. Examples of memory include, but are not limited to, a Random Access Memory (RAM), a Read Only Memory (ROM), a hard disk, and so forth. A person skilled in the art will appreciate that other types of computer-readable media which can store data that is accessible by a computer, such as magnetic cassettes, flash memory cards, digital video disks, and the like, may also be used by device **102***b*. Memory **506** may include Operating System (OS) (not shown) for device **102***b* to function. Further, memory **506** may include other applications **510** that enable caller **106** to communication with destinations **108***a-n*. Examples of other applications **510** include, but are not limited to, Skype, Google Talk, Magic Jack, and so forth. Other applications **510** may be stored as software or firmware on device **102***b*. Further, memory **506** includes Visuphone **104** for searching and presenting a visual menu corresponding to the audible IVR menu of a destination as discussed with reference to FIGS. **2**A and **2**B. Visuphone **104** may be an application stored as a software or firmware on device **102***b*. The visual menus are stored in visual menu database **308** in memory **506** of device **102***b*. Visuphone **104** searches visual menu database **308** for visual menu corresponding a phone number of a destination dialed by caller. Subsequently, the visual menu is presented on display **512** for selection of options by caller. Further, Visuphone **104** may be implemented as plug-in to other applications **510**. Therefore, when a phone number is dialed from other applications **510**, Visuphone **104** detects the dialing and automatically searches and displays the visual menu corresponding to the dialed phone number. Thereafter, caller can interact with the visual menu, without listening to the audible IVR menu of destinations.

With reference to FIG. **6**, an exemplary display of a visual menu **604** on device **102***b* is illustrated. Caller may dial a phone number **610** from a VOIP application **608** on device **102***b*. Phone number **610** may correspond to any of destinations. In an embodiment, caller selects a pre-stored phone number from the application **608**. Subsequently, visual menu **604** corresponding to a dialed destination is displayed on display **512**. In an embodiment, display **512** may comprises a touch sensitive screen. Therefore, caller can interact with device **102***b* directly through display **512**.

In an exemplary instance, if caller **106** dials a phone number of destination, then a visual menu corresponding to audible IVR menu of destination is displayed. Thereafter, caller can interact with the visual menu to select options and to transmit inputs for the audible IVR menu of the corresponding destination. Visual menu **604** could be displayed before actual connection of device **102***b* to destinations. Therefore, caller **106** can select a desired option from visual menu **604** before establishing a connection to the destination. Depending on the complexity or size of the destinations, visual menu **604** may have various nodes. For example, an organization with 50 departments may have more menu options or nodes than that of an organization with 10 departments. Further, the display area of display **512** may be limited. As a result, all the nodes of visual menu **604** may not be displayed together on display **512**. In such a case, Visuphone **104** is configured to allow caller **106** to navigate by scrolling horizontally and/or vertically to view nodes on visual menu **604**. Moreover, caller **106** can search for a desired option from the visual menu.

Subsequently, after caller **106** selects a desired option from visual menu **604**, a connection is established between device **102***b* and a destination based on the selected action. In one embodiment, Visuphone is configured to detect and present applications suitable to caller for initiating the connection. For example, Visuphone may detect more than one VOIP applications present in device **102***b* and present them to caller **106** on display **512**. Thereafter, caller can select an application to be used or initiate the connection in a default configuration. The default configuration can be for example, VOIP application **608** on which phone number **610** was dialed. In another embodiment, caller **610** may select a phone number displayed in applications such as a browser, messenger, or a mail client. Subsequently, Visuphone detects and presents applications suitable to caller for initiating the connection. Furthermore, Visuphone is configured to display visual menu **604** for the phone number selected from the applications.

Visuphone is further configured to display an advertisement **606**. Advertisement **606** may correspond to the type of services provided by destinations. For example, if the destination is a bank, then advertisement **606** may include promotions or offers about new loans or schemes. Moreover, advertisement **606** may include promotions or offers from a third party or a competitor of destination. Visuphone may be configured to connect to intended destination, when caller selects advertisement **606**. Further, Visuphone displays visual menu **606** of the intended destination. In an embodiment, Visuphone stores the interactions of caller with visual menus after a call to an IVR was made. Therefore, when caller calls the same destination again, then the options that were selected in the last interaction are presented prominently. Further, the options that are frequently selected can be presented prominently. For example, if caller dials a bank frequently to check his account balance, then the options for selecting his account balance may be highlighted. Additionally the information such his account number can be brought up to save effort for the user who can than just OK for that 'auto fill' to be dialed out to the IVR at the proper time.

With reference to FIG. **7**, device **102***b* may include a web browser **702** to display web pages from the Internet and/or other computer networks. Various websites provide a phone number on the web pages as a click-to-talk button. The clickable button can provide, for example, a contact number of executives of the organization. The clickable button may be programmed to display a phone number of the organization and/or display a caller a form to provide his contact details, so that an executive from the organization can call back the caller. Visuphone is configured to detect a connect **706** button on a webpage **704**. Connect **706** may be used by Visuphone to initiate a connection to a destination.

Visuphone detects and launches a VOIP application on device **102***b*. In an embodiment, in case more than one application is available on device **102**, Visuphone selects a VOIP application preferred by caller. Moreover, Visuphone **104** may be configured to automatically login into the VOIP application. In an embodiment, caller **106** stores the login details for the VOIP application in Visuphone. Further, Visuphone displays a visual menu corresponding to audible IVR menu of the destination connected once click on the connect **706** tab. Therefore, caller can connect to the destination from web browser **702** automatically and may not be required to dial the phone number or provide a call-back information.

In an embodiment of the invention, Visuphone **104** may include a VOIP plug-in that monitors the outgoing calls made from the VOIP application. Therefore, the VOIP plug-in may search each dialed number in visual menu database **308**. In case, the dialed number is found in visual menu database **308** and is associated with an IVR, then the VOIP plug-in may display the visual menu corresponding to the audible IVR menu of the dialed number.

Another embodiment of the invention allows the user to select the visual menu using car display like GPS display. Hands-free cell phone system is used in many cars as a separated device or as an integrated system in the car. These devices allow the user to talk with the cell phone without holding the cell phone in his hands. Some devices are using the car speakers for the phone call. In many cases, the hands-free system can use a display screen in the car like GPS screen or other display. Following voice menu while driving might not be the optimal way to use hands-free cell phone system. In some cases, selecting an option from a visual menu is preferred. While driving or stopping in red light, it might be easier to use larger display like the GPS display in the car. The display can present the visual menu and the user can select the option from the menu. The computing engine to support the visual menu could be embedded in the car GPS system or in another controller that have access to the car display. Once the system recognize a destination of a call to be an IVR it will access the database pull out the menu and display. Accordingly all the other Visuphone features could be incorporated.

FIG. **8** illustrates exemplary software architecture **800** of Visuphone **104**, in accordance with an embodiment of the invention. Hardware layer **802** includes various hardware of device. For example, but not limited to, a mouse, a keyboard, a speaker, a microphone, a camera, a USB device, a display and so forth. The drivers required for the hardware of device are provided by drivers layer **804**. Moreover, drivers layer **802** interfaces with Operating System **806**.

Operating System **806** provides memory and environment required by Visuphone **104** and other applications **808** for functioning on device. Examples of Operating System **806** include, but are not limited to, Windows, Macintosh, Linux, Symbian, Andriod and so forth. Visuphone **104** may be implemented as a plug-in to other applications **808**, such as Skype, Google Talk, web browser, mail client, and so forth. In an embodiment, Visuphone **104** may be implemented as a standalone application on device. Further, Visuphone **104** may be configured to execute as a background application. Therefore, caller may not be required to specifically launch Visuphone **104**. Furthermore, Visuphone **104** may be implemented as a multi-threaded application. Therefore, visual menus of more than one destination may be displayed simultaneously on device.

FIG. **9** illustrates exemplary components of Visuphone **104**, in accordance with an embodiment of the invention. As discussed above, Visuphone **104** may be implemented as hardware, software, or firmware on a device. Further, Visuphone **104** may be configured to execute as a background process on device. In an embodiment, Visuphone **104** may be configured to execute as a system service. Therefore, other processes or applications executing on the device may not block the operation of Visuphone **104**.

When caller dials, selects or receives a phone number on the device, a detection module **902** of Visuphone **104** detects that a phone number has been dialed, selected or received. For example, detection module **902** may detect key presses or caller ID on device. Caller may use a VOIP application on device for dialing the phone number. Moreover, caller may use a mouse to a joystick to select or press icons of numbers displayed on the VOIP application. Further, detection module **902** is configured to identify the VOIP applications available on device and used by caller. Moreover, detection module **902** may detect the position co-ordinates of the VOIP application on a display of device. For example, in case device includes the Microsoft Windows OS, then the position co-ordinates of the VOIP application can be detected from the registry of the OS. Detection module **902** may be configured to store the position of number icons relative to position co-ordinates of various VOIP applications. Therefore, based on the co-ordinates of the position of the VOIP application, detection module **902** can detect the exact position of each number icon on the display of device. For example, if the co-ordinates of a top-left edge of the VOIP application is (X,Y) on the display, and the co-ordinates of an icon for number '1' on VOIP application is (X1,Y1) relative to its top-left edge, then the exact co-ordinates of the icon for number '1' may be calculated as (X+X1, Y+Y1) on the display. A person skilled in the art will appreciate that other types of mathematical operations can be applied to calculate the co-ordinates of the icons on the display of the device.

Detection module **902** may be configured to detect the co-ordinates of the cursor on the display of device. Further, detection module may be configured to detect the action events generated by the mouse or joystick, such as a click, a double-click, drag, select, scroll and so forth. Therefore, when caller selects or press a number on the VOIP application, detection module **902** may detect the number from the position of the cursor, the VOIP application and the number icon. In an embodiment, detection module **902** may be configured to store the last used co-ordinates of the VOIP application and number icons. Therefore, detection and/or calculation of the co-ordinates may not be required. Furthermore, detection module **902** may be configured to detect a connect button displayed on a web page of a browser on device as explained with reference to FIG. **7**. Therefore, when caller clicks the connect button, detection module **902** identifies the phone number behind the connect button. In an embodiment, detection module **902** detects the connect button and the associated phone number by scanning the source code of the web page.

The phone number detected by detection module **902** is used by a search module **904** of Visuphone. In an embodiment, detection module **902** may be configured to transfer each digit to search module **904** in real-time as clicked by caller. Search module **904** searches visual menu database for visual menu corresponding to the phone number. An exemplary visual menu is as explained above in conjunction with FIGS. **2**B and **2**C. As discussed above, visual menu database stores visual menus corresponding to the audible IVR menus of destinations. Moreover, visual menu database may store other information, which is explained in conjunction with FIG. **10**. Search module **904** may also be configured to search for other information in visual menu database. In an embodiment, search module searches visual menu database in real-time based on the digits received from detection module **902**. Therefore, a visual menu may be identified based on the best match of the number formed by the received digits in visual menu database. As a result, caller may not be required to dial, click, press or select the complete number, which may be convenient and time saving.

The visual menu identified by a search module **904** is displayed on the display of device by display module **906** of Visuphone **104**. Display module **906** identifies the position on the display where the visual menu is to be displayed. In an embodiment, the visual menu is displayed such that there is minimum overlap with the VOIP application from which the phone number was dialed or selected. Moreover, display module **906** identifies the size of the visual menu for display based on the characteristics of the display screen of device. Examples of characteristics of the display screen include, but are not limited to, a screen size, resolution, and so forth. Furthermore, in case the visual menu is not completely displayed on the display, then display module **906** may allow caller to navigate the visual menu by scrolling. Moreover, display module **906** may be configured to display other information received from search module **904**.

Caller may interact with the visual menu or other information displayed on device. For example, caller may scroll through the visual menu, or select a node from the visual menu. Therefore, when caller selects a node from the visual menu, detection module **902** detects the selected node and communicates the selection to a connection module **908**. Thereafter, connection module **908** may establish a connection between device and a destination based on the nodes selected by caller. Connection module **908** may be configured to detect communication systems available in device. For example, in a case, device is a phone not connected to the Internet, connection module **908** may detect that only a radio connection can be made. Otherwise, a most suitable or a connection preferred by caller can be made. In an embodiment, connection module **908** may allow caller **106** to select a VOIP application to establish the connection. In another embodiment, communication module **908** may launch a default VOIP application on the device **102**. In yet another embodiment of the invention, connection module **908** can use a VOIP protocol stack defined by Visuphone to establish the connection.

Sometimes, a call of caller may be transferred from one point in the organization to another point within the same organization or to a completely different organization. For example, the call of caller with destination **108***a* may be transferred to destination **108***b*. However, destinations **108***a* and **108***b* may have different audible IVR menus. Connection module **908** is configured identify the transfer of call and to switch the visual menu of destination **108***a* with destination **108***b*. The switching of visual menus is explained in detail in conjunction with FIG. **11**.

Some organizations such as banks may require caller to present a voice input for the purpose of authentication. For example, caller may be required to voice out his name or an answer to a security question specified by caller to the bank. Furthermore, voice input may be required to accept or decline a transaction. Caller may record and store the voice responses for such authentications or questions alternatively the system can use synthesis voice. Therefore, when connection module **908** detects that a voice authentication is required, and then voice module **910** is used. Voice module **910** provides voice

inputs on behalf of caller by using the responses recorded by caller. Subsequently, the connection or the transaction can be processed.

As discussed in conjunction with FIGS. **4** and **6**, Visuphone **104** may be configured to display advertisements on device **102**. The advertisements are managed by advertisement module **912** of Visuphone **104**. The advertisement may be selected based on the type of destinations. For example, when a dialed destination is a bank, then an advertisement related to banking may be displayed. Moreover, the advertisement can be related a third-party dealing in the same business or professional area or a competitor of the dialed destination. The displayed advertisement may be a text, audio, image or video. In one embodiment, advertisement module **912** may display the advertisements based on the connection bandwidth available at device **102**. In another embodiment, advertisement module **912** may display the advertisements based on the pre-set preferences by caller. In one embodiment, advertisement module **912** may be configured to receive the advertisements directly from the dialed destination. In another embodiment, advertisement module **912** may be configured to receive the advertisements from a remote server on a network. The remote server is explained in detail in conjunction with FIG. **10**. A selection or click by caller on advertisements may be detected by detection module **902** to display a visual menu of the destination for which the advertisement was displayed.

In some cases, the audible IVR menu of destination may change. For example, the extension numbers of agents in banks may be changed due to addition of new agents. A person skilled in the art will appreciate that there can be other reasons for the audible IVR menu of a destination to be edited, amended or updated. Further, new organizations may be available that use audible IVR menus. The visual menus for these new organizations may not be available in visual menu database stored on device. Therefore, visual menu database may be required to be updated. In an embodiment, Visuphone may be updated to provide additional functionalities to caller. Update module **914** may be configured to update the visual menus stored in visual menu database of device. Moreover, update module **914** may be configured to update Visuphone. Update module **914** may receive the updated visual menus from the remote server on the network. The remote server is explained in detail in conjunction with FIG. **10**.

Visuphone may record the caller's selections or keystrokes for audible IVR menus by using customization module **916**. The keystrokes may be some personal data of the caller such as his account number, customer number, and so forth. Visuphone can provide better support to caller by presenting the recorded keystrokes so that the caller can approve and sending them without entering them every time. Customization module **916** personalizes the generic visual menu by associating the keystrokes with it and storing in visual menu database **308**. Alternatively, an additional set of standard may be defined for representing caller data. In this case, only the code indicating the type of required data is added to visual menu database **308**. Visuphonecan than build a relatively small table in visual menu database **308**, with the various personal data codes and the actual caller data as analyzed from the caller's keystrokes during his connection with destinations of the audible IVR menus.

FIG. **10** illustrates an exemplary remote server **1002** connected to a remote repository **1004**. As shown remote server **2002** is connected to device **102** through a computer network **1006**. Further, remote server **1002** can be connected to destinations **108***a-n* through network **1006**, a gateway **1008**, and a PSTN **1010**. A person skilled in the art will appreciate that device **102** can connect to destinations **108***a-n* directly through PSTN **1010**, therefore the connection is not limited to network **1006**. Each of destinations **108***a-n* may be connected to audible IVR menu repository **1012***a-n*, here after referred to as destination repository **1012***a-n*.

Further, device **102** includes visual menu database **308**. As discussed above, visual menu database **308** includes visual menus corresponding to audible IVR menus of destinations **108***a-n*. Moreover, visual menu database **308** may store other information such as profile of caller, voice response of caller, login details for a VOIP application, preferences of caller, ratings for visual menus, identity of visual menus and so forth. As discussed in conjunction with FIG. **9**, Visuphone, the visual menus or other information stored in visual menu database **308** may require to be updated. In an embodiment, visual menu database **308** is updated by information received from remote repository **1004**. In another embodiment of the invention, visual menu database **308** may be updated by receiving menus through Short Messaging Service (SMS). The SMS may be sent from destination **108***a-n* or remote repository **1004** to device **102**. Remote repository **1004** includes visual menus corresponding to audible IVR menus of destinations **108***a-n*. Further, remote repository **1004** stores advertisements related to destinations **108***a-n*, last updated time of the visual menus, rating of visual menus, and so forth.

In case, the audible IVR menu of a destination is changed, caller may not be able to connect to the destination by using Visuphone. Visuphone is configured to detect the error generated while establishing the connection. For example, caller may select a node in the visual menu that may not have a corresponding option available in audible IVR menu, or a connection not be established between device **102** and the destination. The error is detected by update module **914** of Visuphone. Subsequently, update module **914** sends an error report to remote server **1002**. Remote server **1002** may check remote repository **1004** for updates related to the visual menu. Thereafter, in case any updates are available, remote server **1002** may send the updates to device **102** for performing the update. In an embodiment, visual menu database **308** may be checked and updated based on a pre-defined time interval by the device **102**. In an embodiment, the error report may include the error generated and an Identity (ID) or version of the visual menu on which the error was generated. In case, the updates are not available in remote repository **1004**, then an update of remote repository **1004** may be required. In an embodiment of the invention, remote repository **1004** is updated based on a pre-defined time interval. In another embodiment of the invention, the caller can rate the relevance or correctness of the visual menu from device **102**. Therefore, remote repository **1004** can be updated based on a cumulative ratings received from callers and other users of the visual menu. The remote server **1002** can comprise a process of continuously scanning the IVRs **108***a* to **108***n* updating the remote repository **1004** with changes of various IVR menus and adding addition menu records for new IVRs. Also the remote server **1002** might get a 'problem report' from device **102** if caller identify problem between the menu as it is in the database **308** and the audible menu of a specific IVR. In such case a recheck process will be initiated to update the remote repository **1004** and the new information can be than offered to device **102** for download an update.

In an embodiment of the invention, visual menu database **308** may include other information and parameters related to the visual menus. The parameters related to the visual menus enable accessing, modifying or updating of the visual menus. Examples of parameters of visual menus include, but are not

limited to, ID or version of the visual menus, destination phone numbers, and a last update timestamp. Furthermore, visual menu database **308** may include other information such as a profile, the calling history, or preferences of the caller. The calling history of a caller may include the numbers dialed or received, most frequent numbers dialed or received, most frequent nodes selected from visual menus. The profile of a caller may include, but is not limited to, the name, age, sex, address, phone number, profession, office address, recorded voice responses for visual menus, or other personal and professional details of the caller.

With reference to FIG. **11**, the exemplary process for presentation of the visual menu is illustrated when the call of a caller is forwarded or transferred from destination **108***a* to destination **108***b*. Destination **108***a* may have completely different audible IVR menus as compared to destination **108***b*. For example, destination **108***a* may be a loan department and destination **108***b* may be an insurance department of a bank. Similarly, the call may be forwarded from one organization to another. Therefore, caller may be required to respond to a different audible IVR menu. Visuphone **104** may be configured to detect that the call has been forwarded and subsequently display the visual menu of destination **108***b*.

As shown in FIG. **11**, device **102** establishes a connection with destination **108***a* as depicted by arrow **1102**. The connection is established by using the visual menu provided by Visuphone **104** based on destination **108***a*. In an embodiment, the connection is established directly without using Visuphone **104**. Thereafter, destination **108***a* may forward the call to destination **108***b*, as indicated by arrow **1104**. The visual menu corresponding to the audible IVR menu of destination **108***b* may not be visible on device **102**, as the call was forwarded between destination **108***a* and destination **108***b*. In an embodiment, Visuphone **104** may not detect the forwarding of the call. In this case, device **102** may be presented with audible IVR menu of destination **108***b*. Thereafter, Visuphone **104** may record the options and responses on device **104** for the audible IVR menu of destination **108***b*. The recorded options and responses may be stored at remote repository **1004** for updating it. Further, the recorded options and responses may be stored visual menu database of device **102**.

In an embodiment, destination **108***b* sends an identity (ID) or version of the audible IVR menu to a caller as shown by arrow **1106**. The audible IVR menu ID is specific to the audible IVR menu of destination **108***b*. Subsequently, display module **906** of Visuphone **104** uses the audible IVR menu ID to display the corresponding visual menu. Further, a caller may select a node from the visual menu corresponding to destination **108***b*. Therefore, when a caller selects a node, a connection may be established with destination **108***b*. In an embodiment of the invention, connection between device **102** and destination **108***a* is disconnected after establishing a connection between device **102** and destination **108***b*. In another embodiment of the invention, connection between device **102** and destination **108***a* is maintained for complete communication session till the caller disconnects the call.

Another embodiment of the invention allow visual menu for calls made from a conventional home telephone. FIG. **12** illustrate a phone **1204** connected to a Public Switched Telephone Network (PSTN) **1208** and through a gateway **1218** to the Internet network **1220**. Network **1220** may be any service provider that provides services, for example, but not limited to, telephone services, cell phone services, wireless services, Internet services, cable television services, or various combinations of the above or other type of services.

Further, the connection to network **1220** is associated with a wide band Internet 'smart' modem **1206**. Phone **1204** may be a regular phone, such as a landline phone or a cordless landline phone. Modem **1206** may be a Digital Subscriber Link (DSL) modem or a cable modem that connects the home device to the Internet and/or computer network. Modem **1206** is connected to a service provider, and can provide the home devices with telephone, Internet and television services. Modem **1206** may provide both wired and wireless connections. As shown with reference to FIG. **12**, modem **1206** provides the home with the Internet through wire **1210** to a computer **1202**, or through a Wi-Fi connection. Modem **1206** comprises the ability to detect and recognize the dialing made by phone **1204**. The numbers dialed by phone **1204** to establish connection are then compared with a database, such as visual menu database **308**. Therefore, in case the dialed number corresponds to a destination with an audible IVR menu, and a corresponding visual menu exists then, modem **1206** may provide the visual menu on computer **1202** connected to it. Moreover, modem **1206** may use private web sites to present the visual menu or just provide the dialed number to computer **1202**. Thereafter, a software tool on computer **1202** may present the visual menu on the screen of computer **1202**.

Once the connection with the destination has been established, 'smart' modem **1206** will continue to monitor the numbers dialed or received by phone **1204** to browse or advance the visual menu accordingly. Furthermore, the numbers dialed or received may be stored for future processing such as highlighting previous selections in the visual menu, providing customized visual menu and so forth. The Visual menu system comprising computer **1202** and Modem **1206** may incorporate additional enhancements as presented before such as automatic dialing of customer information. The automatic dialing may be achieved by using computer **1202** to initiate and execute such automatic dialing.

In another embodiment of the invention, a house television **1212** may be used to present the visual menu. In various houses modem **1206** decodes television signals and transfer it to a set-top box **1216** that provide signals to television **1212**. The visual menu may be presented on a channel dedicated for IVR. Therefore, when phone **1204** is used to initiate a call, modem **1206** can detect it and present the visual menu corresponding to the dialed number on the designated channel of the television **1212**. Further, all the options described before can be provided now using the screen of television **1212** for the visual menu. The caller selection can be done by using the simple home phone or alternatively using the TV **1212** set top box **1216** remote control. Further, television **1212** screen may be used to present the visual menu in a few alternatives ways. For example, a device provided by a company named RokuInc., allows streaming of content from the Internet to television. Most set-top boxes now have an Internet connection or telephone connections. Furthermore, various devices such as some Digital Versatile Disc (DVD) players, and video game players or controllers such as Xbox or Playstation, can be connected to the Internet. Each of those devices may allow 'smart' modem **1206** to provide a visual menu on the screens of television **1212**.

In another embodiment of the invention a telephone connection may be established through an external telephone service by using a computer, as discussed with reference to FIG. **13**. External telephone service provider **1310**, such as 'Google Voice', which a user may use through the Internet network from computer **1302**. In such case, the user can cause a telephone call to be established by indicating on service provider **1310**-'Google Voice' web site a request to establish call to a designated location. Thereafter, the external service provider **1310** establishes connection **1306** by using PSTN **1308** to connect the user telephone **1304** to a desired destina-

tion **1312**. External service provider **1310** can now present the visual menu as discussed above. External service provider **1310** may present the visual menu on its web site and processed or advanced based on the dial choices made by the user on his computer **1302**. Furthermore, external service provider **1310** can also add various options as described before, such as but not limited to highlighting previous choices, automatic dialing of user information and presenting related advertisements.

Another enhancement for such external service provider **1310** is to provide a 'smart' connect. In case of the 'smart' connect, the user can designate not just destination **1312**, but a specific node of visual menu, such as node **212***b* as discussed with reference to FIG. **2**B. The 'smart' connect will dial the proper selection in the visual menu and connect to node **212***b* of the audible IVR. The 'smart' connect can even wait until the selected node 'Talk to Executive' yields the desired result of the executive answering the line and then connect the user. Therefore, the efficiency of the IVR system does not come at the cost of inefficiency of the user, rather both sides can became more efficient by using the 'smart' connect.

Additional alternatives to the invention are illustrated with reference to FIGS. **14**A, **14**B, and **14**C. FIG. **14**A illustrates a Visu-Add-on **1404** which can be connected to a standard home phone **1402** to provide all the features and functionalities as described above with respect to the Visuphone **104**. Accordingly, phone **1402** may be connected through connection **1406** to add-on **1404** that can be connected to a standard telephone connection line **1410**. Add-on **1404** may comprise a processing unit, a display and a database. The database may be similar to visual menu database **308** as discussed in FIG. **3**. Therefore, when phone **1402** is used to call a destination with an audible IVR menu, a corresponding visual menu is presented on the display of add-on **1404**. Furthermore, the display of add-on **1404** may comprise a touch sensitive screen for added convenience of a user. Add-on **1404** may be loaded and updated by the use of removable memory devices, such as USB flash memory **1408**. Alternatively, Add-on **1404** may comprise a modem to connect either by the use of the telephone connection line **1410** or by wireless means such as WiFi or Bluetooth.

FIG. **14**B illustrates an embodiment, where an add-on unit **1414** is plugged into a conventional digital picture frame **1420** by using a USB port. Digital picture frames recently became quite popular as a convenient way to display family photos in digital format. In this embodiment, picture frame **1420** can display family photo until a call is made by using a phone **1412** to a destination with an audible IVR menu. Phone **1412** may be connected to picture frame **1420** through a connection **1418** and add-on **1414** may be further connected to standard telephone line connection **1422**. Add-on **1414** may comprise a processor and a database. The database may be similar to visual menu database **308** as discussed in FIG. **3**. Therefore, when a connection is made to a destination having an audible IVR menu, then add-on **1414** will present the visual menu on picture frame **1420**. Picture frame **1420** may resume presenting the photos after the completion of the call. Furthermore, the database of add-on **1414** could be updated with one of the options described before in respect to the add-on **1404** of FIG. **14**A. It should be noted that various home television provides functionality similar to picture frame **1420**. Therefore, television can be used as an alternative to picture frame **1420**.

FIG. **14**C present another embodiment that can be applied as presented with respect to FIGS. **14**A and **14**B. It quite common these days to use a telephone handset **1424** that are connected by wireless means to a base station **1430** that is connected by a wire **1432** to the standard telephone lines. Add-on **1426** can comprise an internal radio circuit to detect the wireless communication. Therefore, add-on **1426** can detect the communication between handset **1424** and base station **1430** to present the visual menu. As can be seen with reference to FIG. **14**C, connection through wires such as wires **1406** or **1418** may not be required. Add-on **1426** may be provided by the manufacturer of the handset **1424** and the base station **1430**, or by a third party. A person skilled in the art will appreciate that the functionalities of the add-on units as described in conjunction with FIGS. **14**A, **14**B and **14**C can be combined into a single unit. Therefore, a single add-on unit may be used in various environments as discussed above.

FIGS. **15**A, **15**B, and **15**C illustrate a flowchart diagram for presentation of the visual menus, in accordance with an embodiment of the invention. Caller **106** may dial, select or receive a number to connect to a destination from device **102**. The destination may include an audible IVR menu for interaction with a caller. Further, device **102** may include Visuphone **104** to present a visual menu corresponding to the phone number of the destination. Therefore, a caller can directly interact with an IVR of destination through the visual menu without listening to the audible IVR menu.

At step **1502**, Visuphone such as of device **102** detects a phone number dialed, selected or received by caller for destination. In an embodiment of the invention, the number is clicked according to the display of device **102**. The number is detected by detection module **902** of Visuphone **104**. Thereafter, search module **904** searches visual menu database **308** of device **102** for the phone number, at step **1504**. Search module **904** searches for visual menu and other information corresponding to the phone number. Other information may include, for example, the caller profile, call history of the caller, advertisement associated with the phone number and so forth. In an embodiment of the invention, search module **904** searches visual menu database **308** in real-time. Therefore, the visual menu and other information may be searched with only a few digits of the phone number.

At step **1506**, it is determined by search module **904** whether the visual menu and other information are available for the phone number in visual menu database **308**. In case, the visual menu is available, then the process continues to step **1508**. In case, the visual menu is not available, then device **102** may be connected to remote repository **1004** by update module **914**, at step **1518** as shown with reference to FIG. **15**B. Thereafter, it is checked whether the visual menu is available in remote repository **1004**, at step **1520**. Subsequently, if the visual menu is available, then visual menu database **308** is updated from the information available at remote repository **1004**, at step **1522**. The process then continues to step **1524**.

Further, at step **1506**, once it been determined by the search module **904** that the visual menu for the destination is available in the visual menu database **308**, an asynchrony request is sent to remote repository **1004**, at step **1558**. The request is sent to check whether a newer version of the menu with different content is available, at step **1560**. Subsequently, if such version exists in remote repository **1004**, then visual menu database **308** is updated accordingly, at step **1522**. The process is then continues to step **1524**.

In case, the visual menu is not available in remote repository **1004**, then the process continues to step **1528**. At step **1528**, audible IVR menu selection in detected on device **102**. The audible IVR menu selection may be determined based on Dual Tone Multi Frequency (DTMF) tones or keys pressed by the user of device **102**. Thereafter, in case a selection is

detected, then the dialed number may be detected as a possible destination number. The dialed number may be provided to remote repository **1004** at step **1530**. Thereafter, the process continues to step **1526**, where remote repository **1004** is updated for information.

At step **1524**, it is determined by search module **904** if visual menu is available for the dialed number in updated visual menu database **308**. In an embodiment, Visuphone detects the correctness of information based on the error received on connection to the IVR destination or behavior of the caller. In case, visual menu is available, then the process continues to step **1508**. Otherwise, in case the visual menu is not available, then the process continues to step **1526**, where remote repository **1004** is updated for information. In an embodiment, Visuphone **104** sends an error report to remote repository **1004** to initiate the update. The error report may include the error details of connection, behavior of the caller and other information required to update remote repository **1004**. In another embodiment, the caller may provide ratings for the correctness of the visual menu and other information. Subsequently, the ratings are sent to remote repository **1004**. In an embodiment of the invention, ratings from multiple devices are received at remote repository **1004**. Thereafter, remote repository **1004** may be updated based on the ratings. In an embodiment of the invention, remote repository **1004** may be updated based on a pre-defined time interval. In another embodiment of the invention, remote repository **1004** is updated by an administrator of remote server **1102**.

At step **1508**, if the visual menu is available in the visual menu database, then the visual menu corresponding to the audible IVR menu of destination is displayed on device **102**. In an embodiment of the invention, advertisements related to the type of destination are also displayed on device **102**. At step **1510**, inputs from the caller are detected on the visual menu. In an embodiment, the inputs include the nodes of the visual menu selected by the caller. In another embodiment, the inputs include the advertisement selected by the caller. Subsequently, device **102** is connected to destination based on the inputs provided by the caller, at step **1512**. At step **1514**, it is determined if the visual menu displayed on device **102** is correct. In case, the visual menu is not correct, then the process continues to step **1518**. Thereafter, the process steps as discussed above are followed. However, in case the visual menu is correct, then the connection between device **102** and destination is maintained, at step **1516**. Moreover, further inputs from the caller are received, to continue the communication till the caller or destination disconnects the connection.

The information stored in remote repository **1004** may be gathered from various destinations. For example, various destinations may be called to detect audio IVR menus and accordingly generate the information for remote repository **1004**. With reference to FIG. **16** exemplary components of a device **1602** for implementing a database construction system **1606** are illustrated. Device **1602** can be a computing device such as, but not limited to, a server, a personal computer, a laptop, a mobile phone, a smart-phone, and so forth. Device **1602** can connect to network **1614** through a network interface **1612**. Further, device **1602** can connect to a PSTN **1618** through gateway **1616** and network **1614** through network interface **1612**. Examples of network **1614** include, but are not limited to a LAN, WAN, the Internet and so forth. Although not shown, device **1602** can connect to various external devices such as hard disks, mouse, keyboard, speaker, microphone, displays, Universal Serial Bus (USB) devices and so forth. Further, device **1602** can connect to various destinations **1620***a-n* through PSTN **1618**. Destinations **1620***a-n* may provide audio IVR menu services. In an embodiment of the invention, device **1602** can connect to various devices that include Visuphone for providing updates to visual menu database **308**.

Device **1602** may include a memory **1604** that stores various programs, data and/or instructions that can be executed by a processor **1610**. Examples of memory include, but are not limited to, a Random Access Memory (RAM), a Read Only Memory (ROM), a hard disk, a computer-readable medium and so forth. A person skilled in the art will appreciate that other types of computer-readable media which can store data that is accessible by a computer, such as magnetic cassettes, flash memory cards, digital video disks, and the like, may also be used by device **1602**. Memory **1604** may include Database Construction System (DCS) **1606** for gathering audible IVR menu information, which could be called the IVR customization record, from the destinations and store it in a records database **1608**. In an embodiment of the invention DCS **1606** may be an application stored as software or firmware on device **1602**.

DCS **1606** may include various modules or instructions that may be executed by processor **1610** for generating information in records database **1608**, as explained in detail with reference to FIG. **17**. As discussed above, DCS **1606** may be implemented as software, or firmware on a device. DCS **1606** may be implemented as a standalone module or as several independent instances performing similar jobs without coupling to the IVR destinations. Further, the non-coupling may be managed by a centralize module that may allocate different IVR destinations to each implementation instance of DCS **1606**. In an embodiment of the invention, DCS **1606** and record database **1608** may be implemented on different devices.

Records database **1608**, may include multiple records. Further each record may include an IVR identity code, multiple internal destinations and an activation code for each said internal destination. The IVR identity code may be for example, the phone number of the destinations. The activation code may be for example, a telephone key that should be dialed such as a dial tone associated with the phone number. The internal destination is usually an extension to which the call will be forward once the caller makes a choice, according to the provided menu, and apply the activation code that is usually a dial tone transmitted to the IVR from the Visuphone once the caller dials or selects a proper number or option. Each internal destination may further include another internal destination or extension that may be referred to as a sub-internal destination. Moreover, each sub-internal destination may be associated with a sub-record. Furthermore, the internal destinations may be associated with an icon code. As discussed above, the icons provide a convenient display for the user of a visual menu. In some audible IVR menus the activation code may be a voice command that could be activated by the caller by voicing his selection, or the Visuphone may transmit a pre-recorded voice command or a synthesized voice command when the caller makes a selection from the option menu of the visual menu provided by the Visuphone. Further, records database **1608** may include a record of the metadata or keywords associated with the various options in the menus. The metadata and/or keywords may be used by the Visuphone to enable the caller to search for a desired menu by providing keywords. In an embodiment of the invention records database **1608** is remote repository **1004**.

FIG. **17** illustrates exemplary components of DCS **1606**, in accordance with an embodiment of the invention. DCS **1606** may include a Database Construction Agent (DCA) **1720** for generating information in records database **1608**, as

explained in detail with reference to FIG. **17**B and FIG. **17**C. Some destinations may provide downloadable records or information for the callers. Download module **1710** of DCS **1606**, downloads the information or records provided by the destinations. For example, download module **1710** may download recorded voice phrases, audio data of the audible IVR menu, activation codes, complete audible IVR menu file in a variety of formats and so forth. In an embodiment of the invention, DCS **1606** may connect to various devices that include Visuphone. Therefore, DCS **1606** may receive information from Visuphone, such as personal records, customized records of the callers, and frequently used numbers, keys and so forth. In an embodiment of the invention, download module **1710** may obtain permissions before downloading the information. The permission may be obtained from the user, the destination or both. For example, download module **1710** may display a notification on screen on the device to the user or administrator to permit or reject a download. Moreover, download module **1710** may send an authorized communication such as, but not limited to, a private key to the destination to authorize and obtain permission for download. Personalization module **1708** may generate personalized records for the callers by associating the personal information of the caller with the information, such as the telephone numbers stored in records database **1608**. The records can then be forwarded to the user's device by download module **1710**. Personalization module **1708** may be implemented as instructions executable by a processor. For example, the processor can be processor **1610** or a second processor dedicated for personalization module **1708**. Moreover, the second processor may be CPU **304**, CPU **504** or implemented in another device in communication with DCS **1606**.

DCA **1720** may include a Target List Module (TLM) **1722** that assigns the IVR destination or a target list to each instance of DCA **1720** for connecting and gathering information. The target list may include the IVR identity code, which can be as phone number or any type of information on how to connect to the IVR directly or indirectly. Further, the target list may include additional details such as internal destination. In an embodiment of the invention, the additional information of the internal destination may be implemented as one or more activation codes associate with the IVR identity code.

DCA **1720** may include an IVR Tracking Module (ITM) **1724** that tracks IVR content from a root location associated with the Target information assigned by TLM **1722**. ITM **1724** constructs the full IVR content from a given IVR root.

ITM **1724** may include IVR Logic Module (ILM) **1726**. ILM **1726** may detect the type of IVR of the destination. Typically, various types of audible IVR menus are implemented by destinations. The audible IVR menus may be categorized into various types, such as a simple IVR, IVR with audio response, IVR with additional data authentication and so forth. ILM **1726** detects the type of audible IVR menu, and accordingly the information is generated for records database **1608**. Various categories of the audible IVR menu are explained in detail in conjunction with FIG. **19**. ITM **1724** may call the destinations to determine the category the audible IVR menu. Thereafter, ILM **1726** constructs the database based on the category of the IVR. In an embodiment of the invention, ITM **1724** may call the destinations multiple times to determine the category of the invention. Various audible IVR menus may include a legal notice. For example, the audible IVR menu of a mortgage bank usually include an header stating that this is debt collector and anything stated during the call could be used for future collections. Other statements can be such as those that relate to the option to record the call and so forth. ILM **1726** may detect the legal statements and store them in records database **1608** in association with IVR identity code.

ILM **1726** as part of its internal algorithm will drive the interaction sessions with the IVR. ILM **1726** may include data structure optimized with the tracked IVR menus to decide a right path or a next choice at any existing stage of the IVR tracking. The decisions made by ILM **1726** may be optimized as a mathematically directed graph tracking process. The tracking process may use an option from the audible IVR menu that corresponds to a "return to a previous menu" option of the audible IVR menu. As a result, the number of sessions required for tracking the audible IVR menu is reduced.

The process of IVR tracking may require multiple communications with the audible IVR menu to completely determine the content. Further, during the tracking process the content of the audible IVR menu may be discovered partially. Therefore, ITM **1724** may include a Tree Storage Module (TSM) **1728** to manage a temporary database record. Thereafter, when the process or a phase is complete, TSM **1728** may use Repository Connection Module (RCM) **1738** to submit the content as a batch of records to records database **1608**. In case, a connection to records database **1608** is not available, then TSM **1728** may accumulate the information until a connection can be established.

Dialog Module **1730** of ITM **1724** interacts with the audible IVR menu. Further, dialog module **1730** manages the IVR requests and sends responses according to the decisions of ILM **1726**. Further, dialog module **1730** may use a Speech Recognition Module (SRM) **1732** to interpret the audio of the IVR request to generate multiple records for records database **1608**. In an embodiment of the invention, the audio is interpreted to generate text information. Moreover, SRM **1732** can provide a score to the text generated for each audio, according to the amount of guessing that is required for translating the IVR audio request. SRM **1732** may use a single grammar or a combination of dedicated grammars, for example, but limited to, a specific IVR service topic, IVR service sub topic, IVR stage, IVR location, the specific IVR, the hour of the day, and so forth. Furthermore, SRM **1732** may use multiple preset terms stored in the memory. Examples, of preset terms include, but not limited to, "yes", "no", name of the caller, and so forth. The text generated by SRM **1732** from speech recognition may be parsed by dialog module **1730** to enable ILM **1726** to select a next path or option.

Dialog module **1730** may be required to respond to the IVR requests during a tracking session. Dialog module **1730** may use a response module **1734** to generate the required response. Various audible IVR menus require a voice response from the caller. For example, the voice response may be required for the authentication of the caller. Response module **1734** may provide a recorded voice response to the audible IVR menu. For example, the voice response may be recorded voice phrase or preset of terms such as, but not limited to, "yes", "no", name of the caller, and so forth. Further, the voice response may be a synthesized voice response, generated by response module **1734**. Therefore, response module **1734** may include a voice synthesizer. In this case, the activation code may be the recorded voice phrase and/or the synthesized voice phrase. Moreover, response module **1734** may include a voice decoder to recognize the voice. For example, the voice prompts generated by an audible IVR menu. In some other cases, the IVR menus may require a simple key tone (DTMF). The response module **1734** may include recorded tones or an internal module to generate the require tones.

Various destinations may provide a different audible IVR menu in the working hours and a different menu after working hours or during the holidays. DCA **1720** may detect the various times or time periods for which the audible IVR menus are presented in different mode. SRM **1732** may decode the voice from the audible IVR menu to recognize the IVR message. Further, ILM **1726** may analyze the response message for the periods and different operating mode. Therefore, ILM **1726** may call the destinations based on the recognized periods to generate records database **1608**. Further, records database **1608** may include the time information for which a particular audible IVR menu is active. Accordingly, ITM **1724** may call the destinations multiple times based on the time information.

Various audible IVR menus include multi-level menus, as discussed with reference to FIG. **2**A. Therefore, each level of menu may include sub-menus, which may further include sub-menus, and so forth. Accordingly, records database **1608** may include multiple sub-records, and each of the sub-records may have activation codes associated with them. Furthermore, records in records database **1608** may include a code to indicate a business domain of the destinations, such as airlines, banks and so forth. In an embodiment of the invention, TLM **1722** may use a web-based list such as yellow pages to call the destinations. Generally, the phone numbers of the destinations in the yellow pages are organized based on the business domains of the destinations. Accordingly the business domain code could be added to record database **1608**. As graphics and icons are very effective in enhancing user interface, ITM **1724** may associate various phrases with specific icons. For example, ITM **1724** may include a dictionary of various terms or phrases that are frequently used in IVR menus, such as "customer care", "main menu", and so forth. The terms may be decoded by dialog module **1730** and icons may be associated with them. Accordingly, records database **1608** may include a code for icons associated with the IVR menus of the destinations.

ITM **1724** may include components to connect to the audible IVR menu. As shown with reference to FIG. **17**B, ITM **1724** may include a VOIP connection module **1736** to interact with a VOIP application **1740**. VOIP application **1740** may be implemented within or outside DCA **1720**. In such a case, VOIP connection module **1736** may use VOIP application **1740** to interact with the audible IVR menus.

Further, as shown with reference to FIG. **17**C, ITM may include an IVR connection module **1737**, to interact directly with the audible IVR menu. IVR connection module **1737** may connect to multiple audible IVR menus through a network, a PSTN or any other communication or protocol. Moreover, IVR connection module **1737** may act as a gateway between DCA **1720** and the destination of audible IVR menu.

FIG. **18** illustrates a flowchart diagram for generating records database **1608** by using DCS **1606**, in accordance with an embodiment of the invention. The audible IVR menus of destinations may be analyzed to generate records database **1608** for corresponding visual menus. At step **1802**, a phone number may be dialed to connect to an audible IVR menu of destination. The phone numbers and destinations may be selected automatically from a database of phone numbers. For example, yellow pages for a selected territory, category, business or other suitable classifications. As discussed with reference to FIG. **2**A, the audible IVR menu may include various options for a user to select. Typically, the options are structured and presented in form of levels to the user. For example, with reference to FIG. **2**A, options **204***a*, **206***a*, and **220***a* may form a first level of the audible IVR menu **222***a*. Further, options **208***a* and **210***a* may be referred to as sub-menus to option **204***a*. Similarly, each sub-menu may further comprise sub-menus, such as options **214***a* and **216***a*. Therefore, DCS **1606** is presented with audible instructions at first level. Thereafter, based on the selection by DCS **1606**, corresponding audible instructions of sub-menus may be provided. The first level of the audible IVR menu is analyzed at step **1804**. The audible IVR menu may be analyzed by voice recognition.

In an embodiment of the invention, the voice recognition for constructing records database **1608** is based on context-enhanced voice recognition. As the process of calling the destination is initiated by selecting a number from a list such as yellow pages, the voice recognition system would be provided file of potential menu terms, which could be farther narrowed base on knowledge of the business domain and the potential options such destinations may offer. Therefore, the process of voice recognition is greatly enhanced, when the recognition is done with respect to a relatively small number of choices. SRM **1732** in DCA **1720** may be pre-loaded with a small set of terms most likely used by the destination and, therefore, may be required to make the recognition out of the relatively small set of terms.

Further, the voice may be converted to a text format. In an embodiment of the invention, a voice-to-text application may be used to convert the audible instructions to text format. Subsequently, the information generated from the analysis of the first level is stored in records database **1608**, at step **1806**. The information may include the details about the sub-menu and the numbers to be dialed to access the sub-menu. For example, with reference to FIG. **2**A, the information for option **204**A may include, instruction part 'pizza order' and number part '2' in the database. At step **1808**, it is determined whether there are any sub-menus in the audible IVR menu. The sub-menus may be detected based on the information analyzed from the audible IVR menu. In an embodiment of the invention, sub-menus are detected based on the information stored in the database. In case the audible IVR menu contains sub-menus, then the sub-menus are analyzed, at step **1810**. The sub-menus may be analyzed in a similar manner as the first level of audible IVR menu as discussed above. Subsequently, at step **1812**, the information corresponding to the sub-menus is stored in records database **1608**. At step **1814**, it is determined whether there are any further sub-menus in the sub-menus of the audible IVR menu. DCS **1606** may make select an option for every menu to connect accordingly and determine if a final destination is reached or there is another layer of menu options to be processed. Once the final destination it reached, DCS **1606** may "hang-up" the connection and register the results. Further, DCS **1606** may dial again to iteratively discover the full menu of the IVR. In case, there are further sub-menus then each sub-menu is analyzed as discussed above. The process is iterated till the complete audible IVR menu with the sub-menus is analyzed. Further, the destinations may be dialed multiple times to ensure that complete audible IVR menu and sub-menus are analyzed. Moreover, records database **1608** may be automatically checked and verified after complete analysis of the audible IVR menu. For example, all or various options or sub-menus in the audible IVR menu may be selected randomly or based on a predefined pattern to verify the information in records database **1608**. In an embodiment of the invention, DCS **1606** may be use quality marks for every term recognized during the process. For example, low marks may indicate relatively higher probability that the recognition was wrong. Further, follow-up steps may provide higher priority to check and validate the terms that received low marks. Such check may be performed by an additional automatic system or by human operators. In

an embodiment of the invention, the destinations may be connected automatically through various probe servers to analyze the audible IVR menus. The probe may be implemented as a script, a computer program, or firmware, on remote server **1002**, as shown with reference to FIG. **10**. Further, the audible IVR menus may be analyzed by human operators, in case of malfunction or other issues with the automatic functioning.

In an embodiment of the invention, records database **1608** may be updated automatically based on a pre-defined update time interval. The update may be required to validate the correctness of information in the database. Moreover, records database **1608** may be updated based on ratings from users of Visuphone. For example, the caller may identify that a visual menu incorrect or incomplete, and may subsequently provide a rating to the visual menu. Further, an administrator or user of records database **1608** may update it manually.

Various audible IVR menus require audio commands from the caller instead of selecting options. DCS **1606** analyzes such IVRs to generate records database **1608**. In an embodiment of the invention, a two-phase process may be applied to generate records database **1608**. In the first phase a standard menu is generated for the IVR that may relate to a particular class of the destinations. A class can be a business class, for example, banks, airlines, hospitals and so forth. The first phase could be extended to cover as many domains as possible so that standard menus exist for most business classes of destinations. In the second phase, the IVR that requires a natural language voice command may be interrogated by repetitively applying the standard menus according to the class. Therefore, the relevance of the standard menu for the specific IVR is confirmed. In the process, a stored voice or synthesized voice could be use for each menu option. Thereafter, the menu may be stored in records database **1608** based on the confirmation. Some IVR menus may be require any or both of natural language commands and dial tones. In such a case, both options could be made available in the records database **1608**, and eventually in the visual menu database for the caller at the time of use. As discussed with reference to FIG. **17**, DCS **1606** may determine the type of audible IVR menu for generating records database **1608**.

FIG. **19** illustrates an exemplary set of IVR categories **1902**. As shown a category A **1904** refers to typical audible IVR menus that present IVR options to the caller that can be selected from simple dial tone selections. In this case, DCS **1606** may provide various dial tones to the IVR for analyzing it, and generating records for records database **1608**. A category B **1906** refers to an audible IVR menu that requires the caller to answer some initial questions, before presenting simple dial tone options for further menu. For example, the caller may be required to select a language preference, before presenting the menu. A category C **1908** may require the caller to provide some personal information before presenting the menu. For example, the caller may be required to input an account number, a phone number, a customer number and so forth. A category C **1910** refers to an IVR menu that may require voice inputs or natural language selection from the caller. In this case, DCS **1606** generates an activation code that points to a recorded voice phrase or a code that can instruct to synthesize the proper voice phrase required.

Additional variations of the categories include an IVR menu that provides a legal notice. For example, the audible IVR menu of a mortgage bank usually include an header stating that this is debt collector and anything stated during the call could be used for future collections. Other statements can be such as those that relate to the option to record the call and so forth. The statement may be registered and added to records database **1608**, so that the legal statement can be presented with the visual menu. Further, additional statements may be added at the end of the statements regarding the last time when the IVR was verified.

FIG. **20**A illustrates an exemplary information process for an IVR menu stored in records database **1608**. Sometimes, an audible IVR may request the caller for some specific or personal information that is other than selection of IVR options. ILM **1726** may mark such requests and process them separately. ILM **1726** can identify the such requests based on a combination of the identity code and an ordered list of activation codes. As shown, the records database content **2002** may include exemplary request **2004***a* "Please enter the invoice number", request **2006***a* "Please enter the payment amount", request **2008***a* "Please choose your payment card: Press 1 for VISA and 2 for Mastercard", request **2010***a* "Please say or enter credit card number", and request **2012***a* "Please enter your Credit Card expiry date".

Corresponding to these requests a display may be generated on the user's device, an exemplary illustration is as shown with reference to FIG. **20**B. As shown, a web form **2014** is generated corresponding to the requests. Web form **2014** may be presented on a web browser of the user's device. In another embodiment of the invention, the display is presented as an independent form on the display of the device. Therefore, the device may not require a web browser application. Web form **2014** may include single or multiple pages. Further, in case the information is displayed directly on device, then various screens, layers or scroll may be used to display the information. Web form **2014** may include an input box **2004***b* corresponding to request **2004***a*, input box **2006***b* corresponding to request **2006***a*, input box **2008***b* corresponding to request **2008***a*, input box **2010***b* corresponding to request **2010***a*, input box **2012***b* corresponding to request **2012***a*, and a submit button **2016**. The Visuphone on the user's device may automatically complete some or even all the require details based on stored profile or previous inputs of the user. Therefore, the user may only (if at all) be required to complete the missing information manually. Subsequently, the Visuphone may connect to the IVR after the user clicks on the submit button **2016**. Further, the Visuphone may navigate to the process root within the IVR menu, revalidate the process input requests, and transmit the user data to the IVR without any action from the user. Moreover, the Visuphone may hide the IVR validation question such as questions like "are you sure", "did you mean XXX?", and so forth. After the submission, a response such as, but not limited to, a receipt number, specific flight landing time, and so forth may be presented to the user. The response from the IVR can be in various forms, for example, but not limited to, a recorded audible response or a transcript of the audible response.

In another embodiment of the invention, electronic yellow pages directory allows the dialing the number directly from the directory and further provides the visual menu of the destination. The caller can select the exact destination before dialing or follow the visual menu after dialing. For example, an airline company might have various option, menus and layers in the large organization. Selecting the exact department in the organization before dialing can save the user the time and overhead of listening to the menu and making decisions based on the voice menu. The yellow pages company can have a copy of the visual menu database or can be connected to a visual menu service in order to provide the menu to the user.

Alternatively an enhanced web base yellow page could be provided, wherein the caller can first choose the provider he requires to contact. Thereafter, if that destination provides an

IVR, then the enhanced yellow page will use the visual menu database to present a visual menu on the web page. Moreover, the caller can click to choose the internal destination of that provider and the enhanced yellow page may accordingly initiate the call. The call could be made using the conventional telephone network or PSTN. In this case, the enhanced yellow page may need the caller's telephone number to perform the connection. Alternatively, the enhanced yellow page could use VOIP to connect the caller over the web to the IVR of the destination.

In some IVR systems, the caller may have to wait or hold on a queue of previous dialers until the specific department or agent is available. In another embodiment of the invention, the enhanced yellow page system will connect the caller only after the specific agent is available, without waiting in a long waiting line queue. The system can recognize that the waiting queue message of the specific department, and to connect the user only after the agent is answering. Therefore, the waiting time of the caller on the phone queue that sometimes may be very long, may be reduced. The system can park on the line for the waiting line on the specific entry in the menu, as soon as the agent is available, the caller gets a signal to start the conversation with the agent.

Additional advantage of the invention relates to callers who are more proficient in foreign language. Visuphone may provide the visual menu in multiple languages. A caller can than choose a language of his choice and download to his device database the menu in that language.

Yet another advantage of the invention relates to IVR that ask for voice commands. This IVR interface is for some user harder to use due to accent or other problems. The database could be provided with the option as been described before for the system to output voice command according to caller selection of the menu options.

Embodiments of the invention are described above with reference to block diagrams and schematic illustrations of methods and systems according to embodiments of the invention. It will be understood that each block of the diagrams and combinations of blocks in the diagrams can be implemented by computer program instructions. These computer program instructions may be loaded onto one or more general purpose computers, special purpose computers, or other programmable data processing translator to produce machines, such that the instructions which execute on the computers or other programmable data processing translator create means for implementing the functions specified in the block or blocks. Such computer program instructions may also be stored in a computer-readable memory that can direct a computer or other programmable data processing apparatus to function in a particular manner, such that the instructions stored in the computer-readable memory produce an article of manufacture including instruction means that implement the function specified in the block or blocks.

While the invention has been described in connection with what is presently considered to be the most practical and various embodiments, it is to be understood that the invention is not to be limited to the disclosed embodiments, but on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims. The invention has been described in the general context of computing devices, phone and computer-executable instructions, such as program modules, being executed by a computer. Generally, program modules include routines, programs, characters, components, data structures, etc., that perform particular tasks or implement particular abstract data types. A person skilled in the art will appreciate that the invention may be practiced with other computer system configurations, including hand-held devices, multiprocessor systems, microprocessor-based or programmable consumer electronics, network PCs, minicomputers, mainframe computers, and the like. Further, the invention may also be practiced in distributed computing worlds where tasks are performed by remote processing devices that are linked through a communications network. In a distributed computing world, program modules may be located in both local and remote memory storage devices.

This written description uses examples to disclose the invention, including the best mode, and also to enable any person skilled in the art to practice the invention, including making and using any devices or systems and performing any incorporated methods. The patentable scope the invention is defined in the claims, and may include other examples that occur to those skilled in the art. Such other examples are intended to be within the scope of the claims if they have structural elements that do not differ from the literal language of the claims, or if they include equivalent structural elements with insubstantial differences from the literal languages of the claims.

The invention claimed is:

1. A method for generating an Interactive Voice Response (IVR) database, the method comprising:

a list of telephone numbers associated with plurality of destinations implementing IVR menus;

communicating with said plurality of destinations for receiving their voice menu;

wherein said communicating comprise calling at least one destination plurality of times, and

recognizing said at least one destination voice menu and storing the IVR menu record in an IVR database set for storing said plurality of destinations IVR menus.

2. The method of claim **1**, comprises associating at least one icon code with at least one of said IVR menu record.

3. The method of claim **1**, comprises downloading one or more activation codes associated with said at least one of said IVR menus, and wherein said activation codes are associated with one or more internal destinations of said at least one of said IVR menus.

4. The method of claim **1**, comprises performing said recognizing said at least one destination voice menu, at least two times for the same IVR destination and comparing the two voice menu record.

5. The method of claim **1**, wherein said recognizing said at least one destination voice menu comprise the use of a speech recognition algorithm.

6. The method of claim **1**, wherein a code related to a business domain of at least one of said destinations, is associated with a at least one of said IVR menu.

7. A method for construction of an Interactive Voice Response (IVR) database comprising:

having a list of telephone numbers associated with a plurality of destinations implementing IVR menus, wherein the destinations are grouped based on one or more business domains;

calling a telephone number from the list; and

recognizing the voiced IVR menus to generate one or more records of the IVR database, wherein

said calling a telephone number from the list comprise calling plurality of times the same telephone number.

8. The method of claim **7**, comprises multiple preset terms recognizable by said speech recognition.

9. The method of claim **7**, comprises generating a voice command.

10. The method of claim **7**, comprises generating a plurality of calls at different times to a destination.

11. The method of claim 7, comprises:
detecting a legal notice associated with the IVR menus;
storing the legal notice in the memory; and
associating the legal notice with an identification code of said IVR.

12. The method of claim 7, comprises characterizing said IVR as one or more preset IVR types.

13. The method of claim 7, comprises associating at least one icon code with an internal destination.

14. A method for managing an Interactive Voice Response database, the method comprising:
dialing a telephone number corresponding to an IVR destination, the telephone number being dialed to receive an audio information corresponding to one or more options of an IVR menu associated with the IVR destination;
generating one or more records based on the received audio information, the records being generated by using speech recognition; and
storing the generated records in the Interactive Voice Response Database,
wherein the telephone number being selected from a list of telephone numbers corresponding to a plurality of IVR destinations, and
wherein each of the telephone numbers being dialed successively for storing records corresponding to each of the IVR menus related to the IVR destinations, thereby managing the Interactive Voice Response database.

15. The method of claim 14 further comprising analyzing the one or more options using speech recognition to determine one or more hierarchies corresponding to the IVR menu.

16. The method of claim 14 further comprising updating the Interactive Voice Response database by adding one or more properties corresponding to each IVR destination based on an informational database.

17. The method of claim 14, wherein the records comprise a business code associated with the IVR menu.

18. The method of claim 14, comprises said associating personal data of at least one caller with at least one of said telephone numbers.

19. The method of claim 14, further comprising:
detecting a legal notice associated with the IVR menu; and
storing the legal notice in the Interactive Voice Response database.

20. The method of claim 14, further comprising updating the Interactive Voice Response database by storing time information associated with each IVR menu.

* * * * *